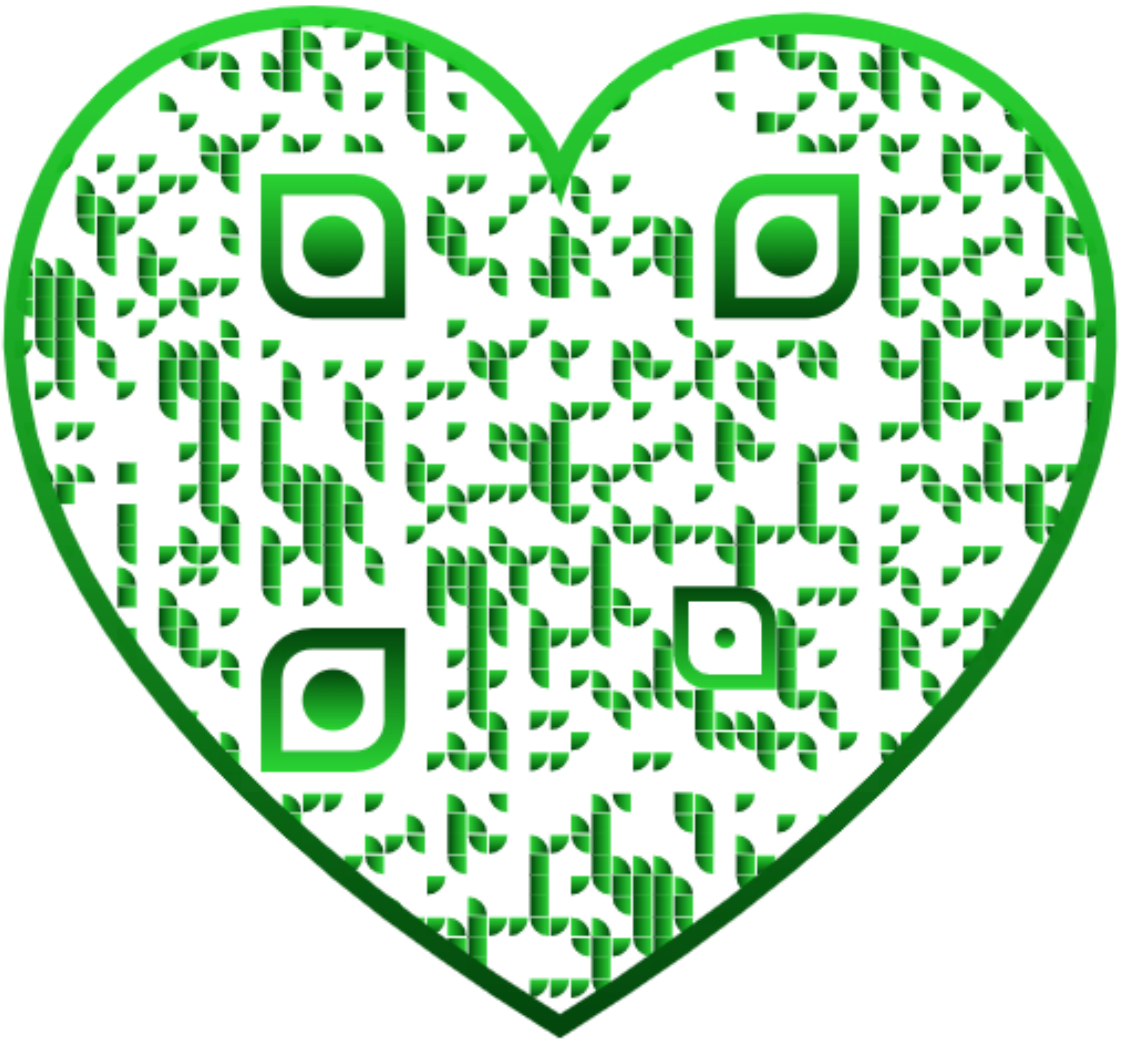
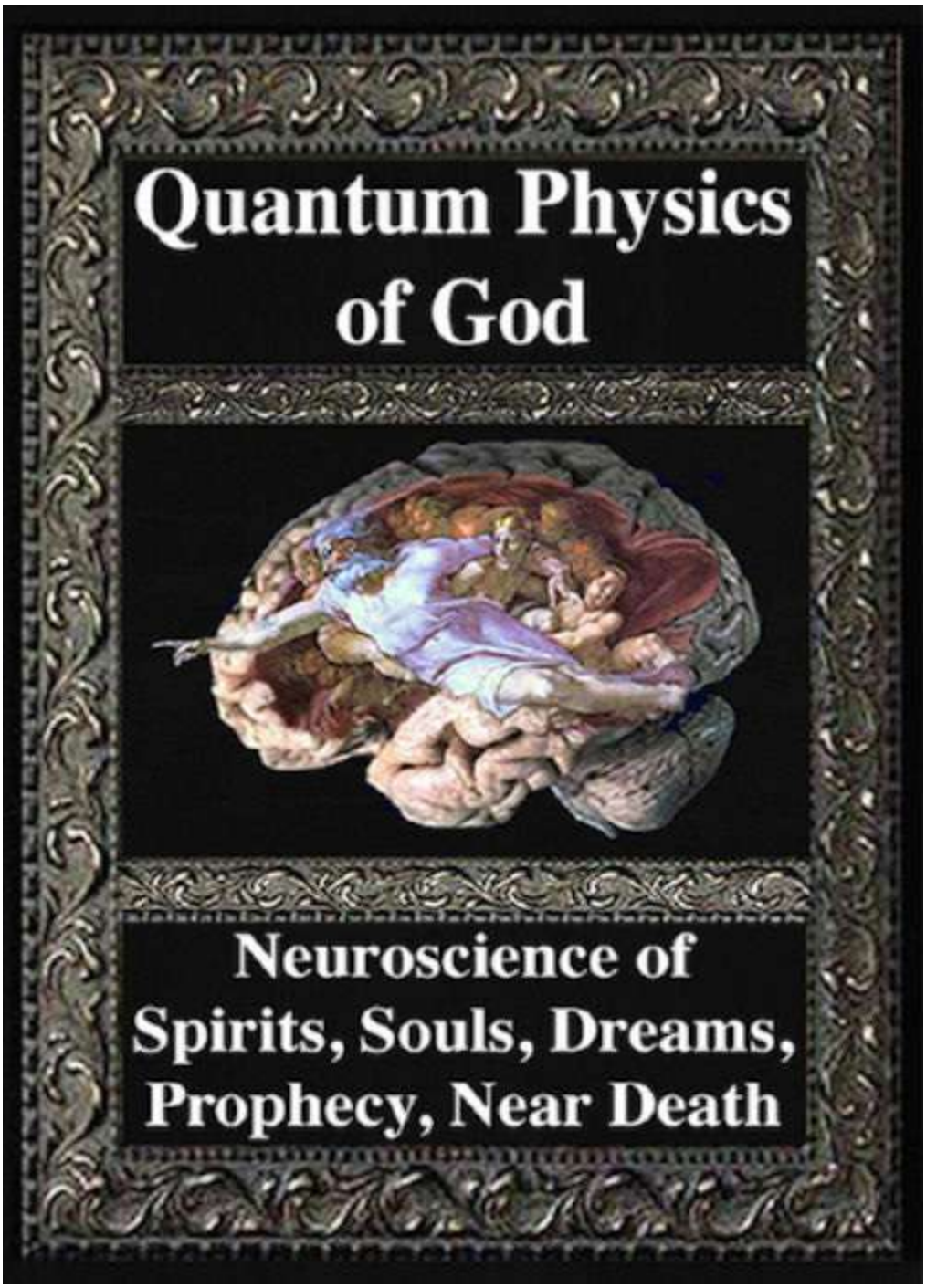
Quantum Physics of God

Neuroscience of Spirits, Souls, Dreams, Prophecy, Near Death





Quantum Physics of God

Neuroscience of Spirits, Souls, Dreams, Prophecy, Paranormal, Near Death

Cosmology Science Publishers, Cambridge, 2015
Copyright © 2015

Published by: Cosmology Science Publishers, Cambridge, MA
Cover Design: R. Joseph

All rights reserved. This book is protected by copyright. No part of this book may be reproduced in any form or by any means, including photocopying, or utilized in any information storage and retrieval system without permission of the copyright owner.

The publisher has sought to obtain permission from the copyright owners of all materials reproduced. If any copyright owner has been overlooked please contact: Cosmology Science Publishers at Editor@Cosmology.com, so that permission can be formally obtained.

Key Words: Quantum Physics, Relativity, Consciousness, Neuroscience, Brain, Mind, Spirits, Souls, Death, Religious Experience

****

Quantum Physics of God

Neuroscience of Spirits, Souls,

Dreams, Prophecy, Paranormal, Near Death

****

By

Deepak Chopra, Menas C. Kafatos, Scott Atran, Matthew Alper, William Braud, Andrew B. Newberg, Kevin R. Nelson, R. Joseph, William P. Brown, Ellert R.S. Nijenhuis, Kelly Bulkeley, Francois Martin, Federico Carmimati, Giuliana Galli Carminati, Horace W. Crater, Stan V. McDaniel, Bruce Greyson, Shaun Gallagher, Juan C. González, Eugene G. d'Aquili, Jeremy Iversen, Fraser Watts, Michael A. Persinger, Bruce MacLennan, Michael Winkelman, Manie Eagar, Enmarie Potgieter, Raymond F. Paloutzian, Thomas G. Fikes, Dirk Hutsebaut, Etzel Cardeña, Rudolph E. Tanzi, Subhash Kak, Jay Kumar, Henry P. Stapp

****

Contents

I: CONSCIOUSNESS, REALITY, COSMOLOGY, INFINITY, AND THE BIRTH AND DEATH OF GODS

1. The Nature of Reality, the Self, Time, Space and Experience
2. Cosmology and the Death of Gods: New Age Religions, Anti-Christ, and Precession of the Equinox
3. Evolution of Spiritual Consciousness and Paleolithic Cosmology

II: NEUROLOGY OF COSMIC CONSCIOUSNESS: DREAMS, DEATH, STARS AND SOULS

4. A Neuro-Cosmology of Death, Souls, Spirits, Rebirth, Astral Projection, Judgment Day, Hell, and the Second Death
5. Near Death Experiences and the 5th Dimensional Spatio-Temporal Perspective
6. Consciousness: Shared Consciousness, Twin Consciousness, Dissociation, Near Death
7. In the Borderlands of Consciousness and Dreams: Spirituality Rising from Consciousness in Crisis
8. Consciousness, Dissociation and Self-Consciousness
9. The Big Dream
10. Possession and Prophecy

III: QUANTUM PHYSICS OF PARANORMAL EXPERIENCES

11. Synchronicity, Entanglement, Quantum Information and the Psyche
12. Consciousness, the Paranormal and Higher Dimensions
13. Cosmological Implications of Near-Death Experiences
14. Consciousness Of The Future: PreCognition, Premonition, Deja Vu
15. The Sixth Dimension: Dream Time, Precognition, Many Worlds

16. Accelerated Dream-Consciousness: Entangled Minds

IV: THE BRAIN, MIND, SPIRITUALITY, RELIGIOUS AND THE GOD EXPERIENCE

17. Altered States of Consciousness, And Neuroscience
18. Neuropsychology of Spiritual and Mystical States
19. Brain, Science, Spirituality, Religious Experience
20. The Neuropsychology Of Spirituality And Religious Feelings
21. Neuroscience and Spiritual Experience
22. Atheism, Religious Conversion & The Logic Of God
23. The Temporal Lobe: The Biological Basis Of the God Experience
24. BrainMind Implications for Religious Beliefs and the God Experience
25 The Evolutionary Origins of Spiritual and God Consciousness
26. Evolutionary Neurotheology & The Varieties Of Spiritual Experience
27. Sex, Violence And Religious Experience

V: SHAMANISM, COSMOLOGY, CONSCIOUSNESS, AND MAGIC

28. Shamanism, Spirituality And Innate Brain Structures
29. Exploring The Contours Of Mind & Consciousness Through Magical-Spiritual Techniques
30. Consciousness, And Mystical, Spiritual And Religious Experience
31. Brains, Science, Paranormal, Mystical & Transcendent Experiences:
32. Altered Consciousness Is A Many Splendored Thing

VI: QUANTUM CONSCIOUSNESS OF GOD AND REALITY

33. How Consciousness Becomes the Physical Universe
34. Perceived Reality, Quantum Mechanics, and Consciousness

35. Quantum Reality and Mind
36. The Cognitive Perception of Happiness: From the Upanishads to Quantum Theory
37. Quantum Physics and the Multiplicity of Mind: Split-Brains, Fragmented Minds, Dissociation, Quantum Consciousness
38. The Quantum Physics of God and the Conscious Universe

*****

****

***

I: CONSCIOUSNESS, REALITY, COSMOLOGY, INFINITY, AND THE BIRTH AND DEATH OF GODS

*****

****

***

1. The Nature of Reality, the Self, Time, Space and Experience

Menas C. Kafatos[1] and Deepak Chopra[2]
[1]Chapman University, Orange, CA 92866
[2]Chopra Foundation, 2013 Costa Del Mar Road, Carlsbad, CA 92009

Abstract

In this article we address the nature of Reality, universal Consciousness and the subjective Self found in monistic systems of India, particularly in many sūtras of Vedanta and Kashmir Śaivism. These monistic systems do not consider time (or space) as primary but treat it as a derivative of consciousness. A brief summary of monism's process of manifestation of all objective existence is described. Monism complements western science. Indian schools of monism complement Western science through intriguing parallels with modern quantum theory and the role of the observer. Moreover, qualia, the innumerable qualities of subjective experiences, play a fundamental role in both monistic and scientific descriptions of consciousness as it unfolds from its source. The conscious universe is an emerging view in science, in accord with ancient views about the primacy of consciousness at every level of reality.

Keywords: Consciousness, Self, time, Reality, experience, quantum mechanics, qualia

Introduction

The problems of experience, and, ultimately, of conscious self-awareness are not addressed by modern science as science deals with the nature of the objective world, with interactions between objects. Although attempts are made in a variety of fields, including psychology, neuroscience and even philosophy of science to address the issue of experience, the basic challenge remains that by its nature, science can only talk about objective reality, while self-awareness ultimately concerns itself with subjective experience and existence. Yet, Indian perennial philosophies have covered the issue of consciousness extensively and provide the means to merge intellectual understanding with personal experiences that begin with everyday

perceptions but extend far into the possibility of mind as a force for altering reality "out there." Monistic systems attribute time (and space) as being derived from experience itself, Consciousness being fundamental. This view is profoundly different from the ontology of science, wherein consciousness is a derivate of physical processes.

This introductory article offers a summary of the nature of Reality, consisting of universal Consciousness, the Self of every being and at every level of existence. The monistic explanation of manifestation and for the emergence of time and space has sufficient rigor to complement Western science and provide insights into the particularly challenging issues of experience itself.

Perennial Monistic Systems

Perennial philosophies concern themselves with the nature of Consciousness, the relationship of the individual to the universe and the relationship of the individual to Consciousness itself. Below we will illustrate with a few selected statements some of these eternal truths and examine how they relate to experience, including how space and time themselves arise.

The non-dualistic systems originating in India, specifically Advaita Vedanta and Kashmir Śaivism, give us a higher view of the individual, the universe and the nature of consciousness. The underlying premise, is that the human being is a reflection of fundamental Consciousness and that in fact there is no difference between the individual and universal Consciousness. Śaivism and Vedanta are complete systems of teachings on the nature of ultimate reality, or the Absolute. This underlying reality is called Brahman in Vedanta and Paramaśiva or Supreme Śiva in Kashmir Śaivism. Both accept Absolute undifferentiated Consciousness as the ultimate Reality, as the underlying reality of all countless objects, subjects and the processes tying them together, such as observation, sentience, understanding, dynamics, cause and effect, etc. Although agreeing on the ultimate Reality, they do differ in emphasis: Vedanta emphasizes that Brahman is the only reality and the perception of the universe as something separate from that as an illusion; while Śaivism accepts the universe as real, being itself, as we will see below, part of universal Consciousness. The universe is part of the whole, albeit being the physical, mental, subtle and in fact all objective experience, of the great underlying sea of Consciousness.

Advaita Vedanta

Vedanta accepts the authority of three sets of works, spanning several centuries: The Upanishads, the Brahma Sūtras, and, the Bhagavad Gītā (Kuiken, 2006). Its basic principles are summarized in the Viveka Chudamani (Crest-Jewel of Discrimination) by Adi Śankarā:

a) "Brahman is Reality" b) "The world is an illusion" and, 3) "The individual Self is nothing but Brahman".

Śankarā's "illusion" is taken to mean the misinterpretation of experience (and not "non-existent."). To see the world as independent and separate from the Self, is an illusion. To know reality is to experience the diversity of the universe (Brahman) as identical to one's Self (Ātman). Sutra 4 of the Isha Upanishad asks: "How can the multiplicity of life delude the one who sees its unity?" And the Nrsimhottaratapaniya Upanishad states: "All this is Ātman, all this is Brahman, all this is consciousness".

The Viveka Chudamani (Crest-Jewel of Discrimination) of Adi Śankarā states: "The Ātman is one, absolute, indivisible. It is pure consciousness. To imagine many forms within it is like imagining palaces in the air. Therefore, know that you are the Atman, ever-blissful, one without a second." The Aparokshānubhuti (Self-Realization) of Adi Śankarā states in sūtra 45: "There exists no other material cause of this phenomenal universe except Brahman. Hence this whole universe is but Brahman and nothing else". While sūtra 49 states "Inasmuch as all beings are born of Brahman, the supreme Ātman, they must be understood to be verily Brahman". In short, Vedanta's ultimate teaching is that Ātman (individual Self of any being) is identical to Brahman.

Kashmir Śaivism

The ancient system, Śaivism and its more recent specific form as developed in Kashmir, (Dyczkowski, 1992, 1994; Singh, 1980, 2006), constitutes a body of philosophical teachings, with practical implications for everyday life. Kashmir Śaivism flourished in Kashmir between the 8th – 12th centuries CE, and was developed and built in the tradition of Vedanta. Kashmir Śaivism was developed in that brief but very active period by sages such as Vamana (779 – 813 CE), Vasugupta (875 – 925 CE), Utpaladeva (disciple of Vasugupta, 900 – 950 CE), Kallata (also disciple of Vasugupta), Bhaskara,

Somananda, the great Śaivite master Abhinavagupta (950 – 1020 CE), and Kṣemarāja (a great disciple of Abhinavagupta). They have left us a rich, dynamic vision of the universe and our place in it.

Śaivism is a Trika (triadic) system, consisting of Paramaśiva or supreme Śiva, the Absolute, undifferentiated Being; Śakti (universal Energy), also known as Citi (universal Consciousness, as the creative power of the Absolute); and the individual soul. The triadic teaching holds that there is no difference between Śiva and Śakti/Citi, and in fact no difference between Consciousness which is the One Paramaśiva/Citi and the individual. The monism could be also viewed as a three-fold Reality, consisting of Consciousness, the universe, and the individual; or, alternatively, the object, the subject and the processes tying them together: Paramaśiva , the supreme Being is identical to supreme Consciousness, the Self of everything in the universe. The view of the underlying Reality in Śaivism is in harmony with Vedanta (Pandit, 1977). Paramaśiva is the Absolute, undifferentiated universal Being, and as Brahman in Vedanta, is the underlying substratum of all existence. As Citi unfolds the universe, She (the Creatrix of everything) is the ultimate source of all manifestations, all objective existence, all experiences of the subjective selves and as such, is also the source of the mind. In other words, the dynamical aspect of Consciousness gives rise to countless beings and countless worlds. Citi represents the immanent part of existence, while Paramaśiva the transcendent aspect of the same identical existence. Śaivism is perhaps unique of all monistic systems in assigning reality to everything that exists. It does not deny the existence of the universe, but instead it considers the universe as real as the infinite Self, because in fact the universe arises from the Self. Countless or infinite numbers of universes and countless beings and objects are all emanations of the creative power of Citi. The creative process itself manifests in an infinite variety of vibrations (Spanda) of Ultimate Reality. Spanda derives from a term which means “subtle motion”, and ultimate Reality is called Spanda because it pulsates. As such, Śaivism is based on the doctrine of vibration (Dyczkowski, 1994). Here quantum field theory (QFT) and Śaivism agree on the importance of vibration in the creative process. Whereas QFT assigns objective existence to vibrations of the quantum field, Śaivism assigns reality of objects to vibrations of the infinite field of Citi.

As in Advaita Vedanta, Śaivism accepts a triadic Self, consisting of the

static (Sat) aspect of the universal Being, the dynamic (Citi or Śakti) aspect of Consciousness, and Bliss (Ānanda). These Three-in-One aspects are not different from each other, they are integral aspects of the One, the undivided sea of Consciousness, which is a dynamic, creative and intelligent Reality.

The first sutra of the Śiva Sūtras states: "Consciousness is the Self". The actual Sanskrit term for Consciousness refers to luminous awareness, the Light of Consciousness. Moreover, Consciousness means more than just (conscious) awareness, it has the absolute freedom of will, knowledge and action. In other words, Reality, which is the universal Self, is identical to Consciousness.

How does the universe manifest? What is the source of the universe? The first sutra of the Pratyabhijñā-hṛdayam, "The Secret of Self Recognition", authored by Kṣemarāja (Singh, 1980) states: "Citi, supremely independent universal Consciousness, is the cause of the manifestation, maintenance, and reabsorption of the Universe". Alternatively, "The universe is the means to attain the realization of free universal Consciousness" (Swāmī Shāntānanda, 2003). The first aphorism gives the underlying cause of the changing universe, as universal Consciousness. Here the three cosmic actions which create, maintain and re-absorb all existence are attributed to Citi. In contrast to the way scientists view the universe as being caused and driven by the laws of Nature, the Pratyabhijñā-hṛdayam states that the cause is Consciousness itself.

How does universal Consciousness unfold the universe? Sūtra No. 2 of the Pratyabhijñā-hṛdayam states: "By the power of her own will, she (Citi) unfolds the universe upon her own screen (i.e. in herself, as the basis of the universe)". Here Kṣemarāja describes the universe as being nothing other than the projection by Consciousness onto Consciousness. What appear as differences in the objectified world, are projected differences in the universal screen of Consciousness.

But then the question would arise, what is the origin of the vast diversity of objectified existence? Sūtra No. 3 of the Pratyabhijñā-hṛdayam, explains: "That becomes diverse because of the division of reciprocally adapted objects and subjects". In other words, division in what appear as objects and subjects gives rise to all diversity. Moreover, in the Paramārthasāra Abhinavagupta states: "Just as in a mirror's reflection a town or a village appears as an image that is not separate from them, yet it appears as separate, and each separate

from the other as well as from the mirror, similarly the universe appears differentiated as one thing is from another, and as well is differentiated from the awakened consciousness of the Self, most pure, though that difference too is not real".

Śaivism emphatically holds that the individual is none other than the entire existence. Sūtra No. 4 of the Pratyabhijñā-hṛdayam states: "Even the individual, whose nature is Consciousness in a contracted state, embodies the universe in a contracted form". While sūtra No. 5 holds that "Consciousness herself, having descended from her expanded state, becomes the mind, contracted by the objects of perception".

In the īśvara Pratyabhijñā Kārikā (Pandit, 2004) Utpaladeva says: "The Great God is the real self of each and every being. He alone endures, through his undiversified Self—his awareness, I am all these". This complementary relationship between undifferentiated Consciousness and the individual operating through the mind, which itself is nothing but Consciousness, is part and parcel of Śaivism.

Manifestation that gives rise to all objects in countless worlds is referred to in many texts of Śaivism, in the Śiva Sūtras, in the īśvara Pratyabhijñā Kārikā, in the Pratyabhijñā-hṛdayam, in the Paramārthasāra, in the great culminating work Tantrāloka of Abhinavagupta, etc. (Singh, 1980; Chatterji, 1986; Kafatos and Kafatou, 1991; Dyczkowski, 1992; Swāmī Muktānanda, 1997; Pandit, 1997; 2004; SenSharma, 2007; Singh, 2006). The universe is projected out in thirty six levels of creation, or levels of manifestation, or planes of existence, called tattvas, from Paramaśiva, to the Earth plane.

At the highest or "pure" five levels, the separation between subject and object has not occurred. It is in a potential or subtle form, the play between Aham (I am) and Idam (This). These levels are:

1) I: Paramaśiva, absolute undifferentiated existence

2) That: Paraśakti, absolute undifferentiated Consciousness or Citi.

The first two tattvas can be counted as one and are implied at every level of existence, as they are not really different from each other. They constitute the perfect I-Consciousness.

The next three levels begin the potential process of manifestation:

3) I (Am) That:

Here I is written in bold for emphasis. In this relationship, as the subjective part of the relationship I (Am) That is emphasized, it signifies the Will aspect

of Consciousness. Before any knowledge (which is to follow) or subsequent to knowledge any action is undertaken, the subject has to be identifying itself with its own will.

4) That (Am) I:

The emphasis is in That, i.e. the statement is written as That (Am) I. Here, as the objective part of the relationship, That is emphasized. As before any action is undertaken, the object has to be identified. Here, it signifies the Knowledge aspect of Consciousness. However, in both these cases, Will and Knowledge, there is no separation, only a (latent) potential of what eventually become a separation between Subject and Object.

5) I (Am) That:

This statement shows balance between the I am and That, and it is recursive, i.e. repeated forever. The balance between Subject and Object signifies the (potential) for Action. But the Subject and Object even in this balanced state, are still One. In action, both the Subject and the Object are balanced, equally weighted.

As we move next to the level of breakdown of the above universal relationships, we have the operation of Māyā. This is the universal (and most often un-understood) freely-undertaken Power, which limits or hides the true nature of Paramaśiva/Paraśakti. Without it, no objectified experience could arise. It gives the appearance of separation, as Śaivism emphasizes. From this point on, the subject and the object seem to be separated:

Māyā and the next five tattvas which accompany it give rise to, respectively: The experience of time; experience of space; (limited ability) of will (to know and act); (limited ability to) know (and then to act); (limited) ability to act.

The same universal statements operate but now in limited form. At that point, the Subject and Object appear separated and they become (many, essentially infinite in number) subjects and objects. The subjects interacting with other subjects and objects now appear as differentiated levels of existence, willing (in a limited way) to know (in a limited way) and act (in a limited way). This in brief, is how Śaivism accounts for time, space and limited abilities of individual beings in terms of the free Power of Māyā.

All 36 tattvas are levels of reality emphasized in different levels of experiences. They are the qualia of all experiences. As such, Śaivism accounts for all Absolute and relative levels of Reality, including time and

space, which manifest in the universe. Beyond this commentary, we can also show how the three universal principles which apply to the quantum, life and all fields, namely complementarity, recursion and sentience, also apply and operate at all thirty six tattvas.

From this monism, the possibility of qualia science can emerge. In qualia science, as in Indian monism, experience comes first. After all, that's how reality actually comes to us, experientially, not in quanta or in differentiated data. At the moment qualia science remains in potentia, but the tradition of Indian monism has fleshed out the absolute state of consciousness, its emergence into manifestation, and every minute gradation of existence that the human mind can conceive. What remains is to build a bridge to the worldview of contemporary science, which is what the essays in this volume of Cosmology attempt to do.

References

Chatterji, J.C. (1986). Kashmir Śaivism. SUNY Press, N.Y.

Dyczkowski M.S.G. (1994). Spandakārikā ("The Stanzas of Vibration"). Dilip Kumar Publishers, Varanasi.

Dyczkowski M.S.G. (1992). The Aphorisms of Śiva, SUNY Press, Albany.

Kafatos M., Kafatou T. (1991). Looking in, Seeing out: Consciousness and Cosmos. Quest Books, Wheaton, IL.

Kuiken, G.D.C. (2006). The Original Gita. OTAM Books, The Netherlands.

Pandit B.N. (1997). Aspects of Kashmir Śaivism. Utpal Publications, Santarasa Books, Boulder.

Pandit B.N. (2004). īśvara Pratyabhijñā Kārikā ("Verses on the Recognition of the Lord") of Utpaladeva (translation with commentary). Muktabodha Indological Research Institute, Delhi.

SenSharma, D.B. (2007). Paramārthasāra ("The Essence of Supreme Truth") of Abhinavagupta (with the commentary of Yogaraja, translation). Muktabodha Indological Research Institute, New Delhi.

Swāmī Muktānanda (1997). Nothing Exists that is not Śiva. SYDA Foundation, South Fallsburg, NY.

Swāmī Prabhavānanda, Isherwood, C. (1975). Viveka Chudamani ("Crest-Jewel of Discrimination") of Adi Śankarā (translation). Vedanta Press, Hollywood, CA.

Swāmī Shāntānanda (2003). The Splendor of Recognition. Siddha Yoga,

South Fallsburg.
Swāmī Vimuktānanda (2005). Aparokshānubhuti ("Self-Realization") of Adi Śankarā (translation). Advaita Ashrama, Delhi.
Singh J. (1980). Pratyabhijñā-hṛdayam ("The Secret of Self-recognition"). Motilal Banarsidass, Delhi.
Singh J. (2006). Śiva Sūtras ("The Yoga of Supreme Identity"). Motilal Banarsidass, Delhi.

2. Cosmology and the Death of Gods: New Age Religions, Anti-Christ, and Precession of the Equinox

R. Gabriel Joseph
Cosmology.com

Most calendars are based on astronomical, cosmic events, including the phases of the moon, the Earth's orbit around the sun, and the rotation of the 12 constellations. Calendars are linked to the cosmos and serve to predict the future, when to plant and harvest the crops, the coming of winter and summer, when leaves and rains will fall. Most calenders are based on rotating cycles, dates repeating themselves, and not just dates, but anniversaries, birthdays, and when to celebrate or lament historical events. Calenders also serve to regulate human behavior, to plan and predict the future, and the best predictor of the future is the past.

The Mayan and Aztec calenders were based on the solar year of 365 days, another on a 260 days year and the orbit of Venus. Yet another was called the long count, and was used to compute and calculate cosmic events which occurred hundreds, thousands, and even millions of years before, and to predict when similar events would happen again.

Mayan scientists learned to chart the heavens, visualize eternity, and to count in millions. Over a thousand years ago, the Mayans calculated the solar year at 365.2420 days (Coe, 2001; Thompson, 1993, Wright, 2011), which is remarkably close to the modern "scientific" figure of 365.2422: the exact length of a solar year. Likewise, the Mayas calculated that it took the moon 29.528395 days to orbit Earth—a figure nearly identical to that given by modern scientific instruments: 29.530588 days.

They also discovered the concept of zero, or nothing (Coe, 2001) and believed in the concept of infinity, as did the Hindu and Aryan sages of

ancient India. They erected great pyramids, astronomical observatories to chart the stars, they speculated about death and the afterlife as related to the planets and the cosmos, and conducted complex mathematical rituals, and employed a variety of mind bending hallucinogenic substances to expand their consciousness and open their minds,

The Mayas may have even determinedthe orbit of our solar system around the Milky Way galaxy which in turn may have been depicted or conceptualized as the god, Quetzocoatl, or a cosmic serpent. Mathematical equations, calculations and predictions decorated public buildings, monuments, pyramids and temples. Some scholars believe, the Mayan priesthood worshipped math and the concept of time.

As summed up by Thompson (1993) “In the Maya scheme the road over which time had marched stretched into a past so distant that the mind of man cannot comprehend its remoteness. On a stela at Quiriga in Guatemala a date over 90 million years ago is computed; on another a date over 300 million years ago is given. These are actual computations, stating correctly the day and month positions, and are comparable to calculations in our calendar giving the month positions on which Easter would have fallen at equivalent distances in the past. The brain reels at such astronomical figures.”

The Mayan astronomer priests of ancient Mexico and Central America, also determined the synodical revolution of Venus, i.e. 584 days, which is the time it takes Venus to return to a specific point in the heavens as viewed from the Earth. Like the medieval Catholic Church, the Mayas (as well as the Aztecs) associated Venus (the Morning Star) with the Great Serpent.

The Mayas recognized that the figure of 584 was just a very close approximation, because the movements of Venus and Earth are not completely regular. The Mayans thus arrived at an “average” synodical period of 583.92 days (Thompson, 1993)—a figure nearly identical to modern estimates.

The Mayan/ Aztec calander predict not just the coming of the seasons and the days of the week, but when the hands of the cosmic clock would shift and the rising sun would appear in a new constellation, thus signifying the coming of a new age every 2,160 years.

CIRCLES WITHIN CIRCLES: MILKY WAY AND THE CONSTELLATIONS

The Milky Way galaxy can be viewed in the darkness of night, edge-on, snaking in a curving arc, forming part of a circle. Through careful observation, the ancient priest-scientists deduced the existence of a circular galaxy, of which Earth, and the constellations circled round, or which circled round forming a cosmic clock.

FIGURE: Milky Way galaxy

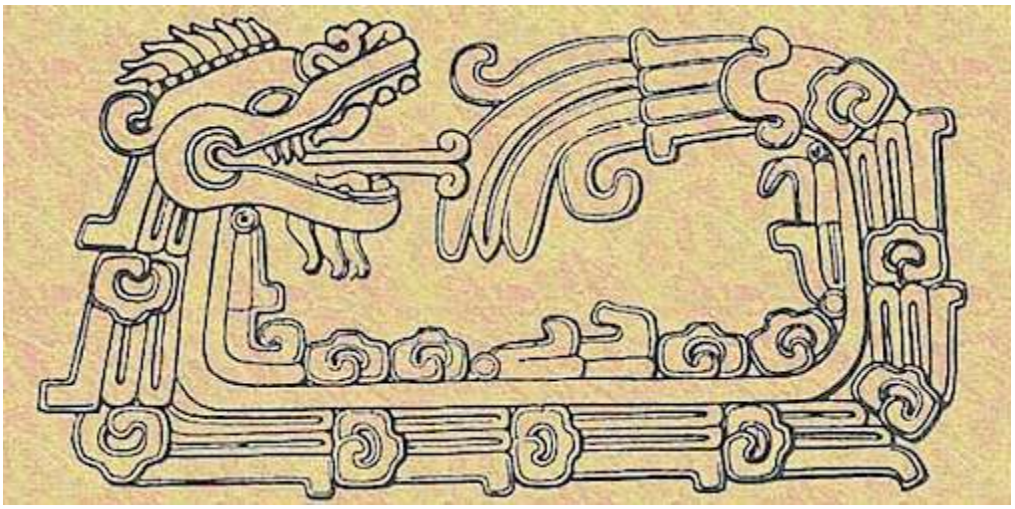


FIGURE: Quetzalcoatl Maya Galaxy

FIGURE: Milky Way galaxy

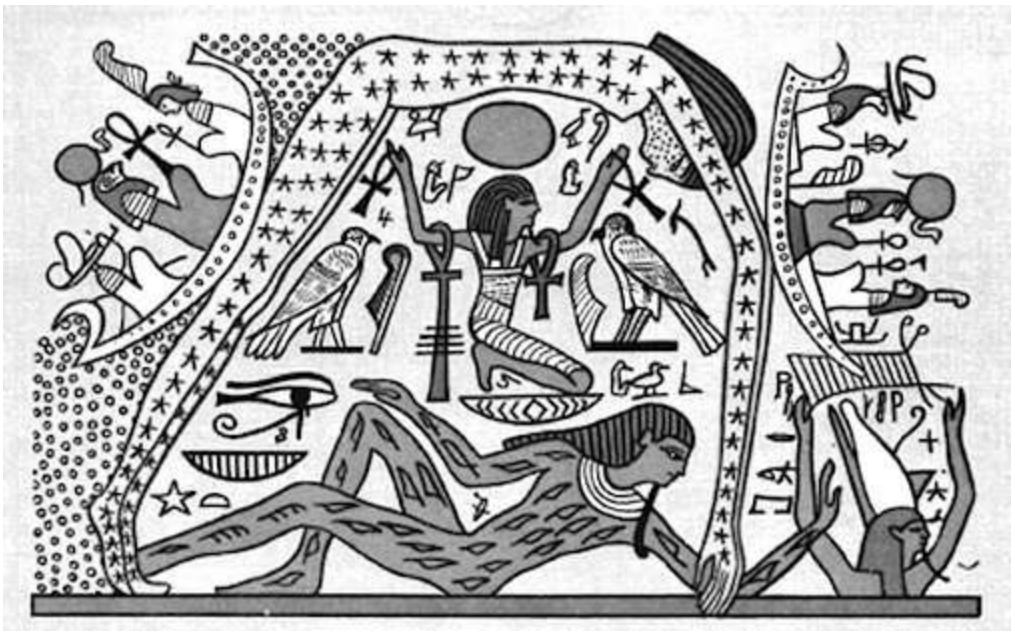


FIGURE: Egyptian: Note Key of life representing the sign of the cross, and coiled around are the stars of the milky way galaxy.

FIGURE: Milky Way Galaxy, viewed from Earth, with some of the constellations depicited. Not position of Orion (Osiris) and Gemini (compare with figure below)

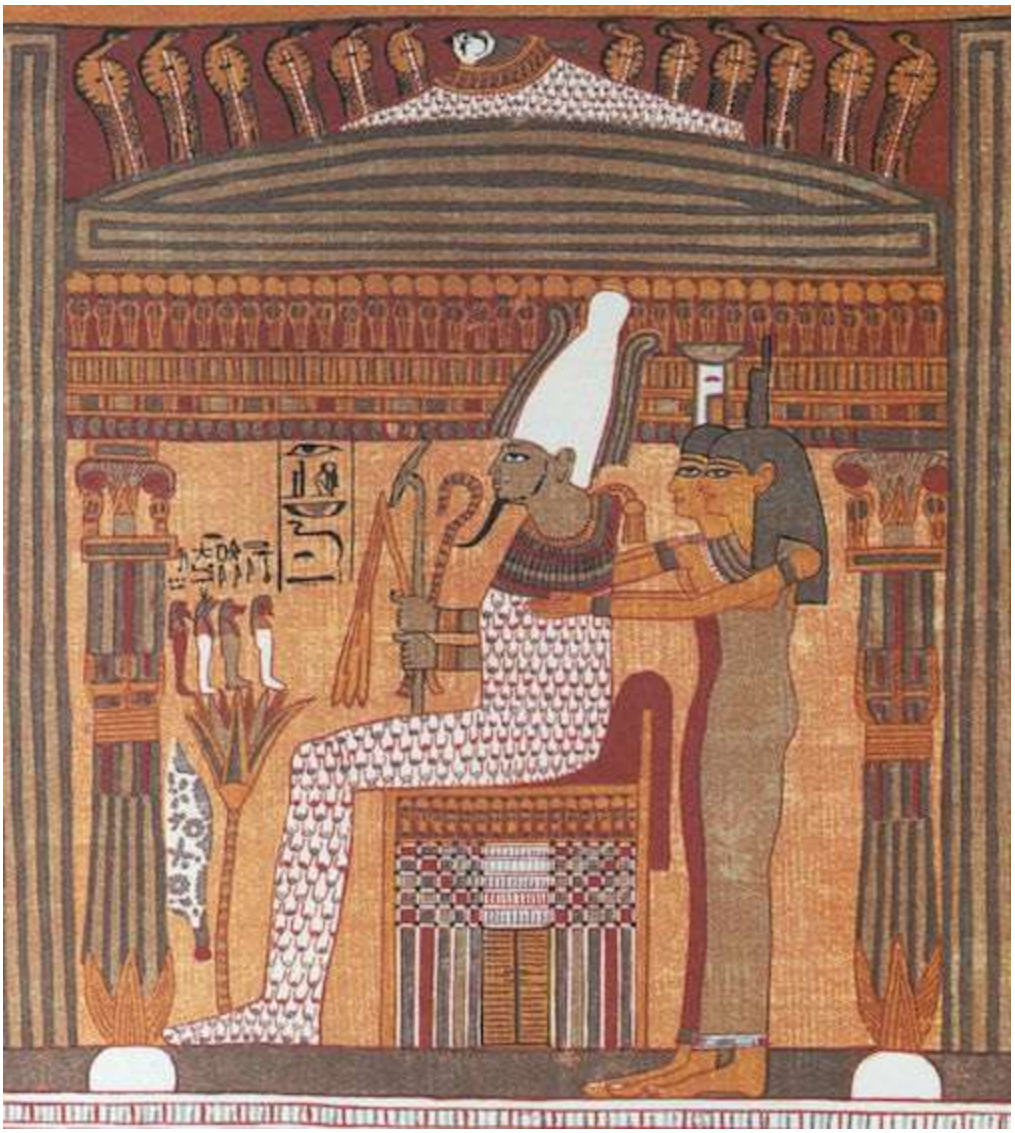


FIGURE: Ancient Eguypt: Osiris atended by the Gemini twins, and above: the Milky Way galaxy, and 12 constellations of the zodiac represented by snakes.

The Milky Way Galaxy

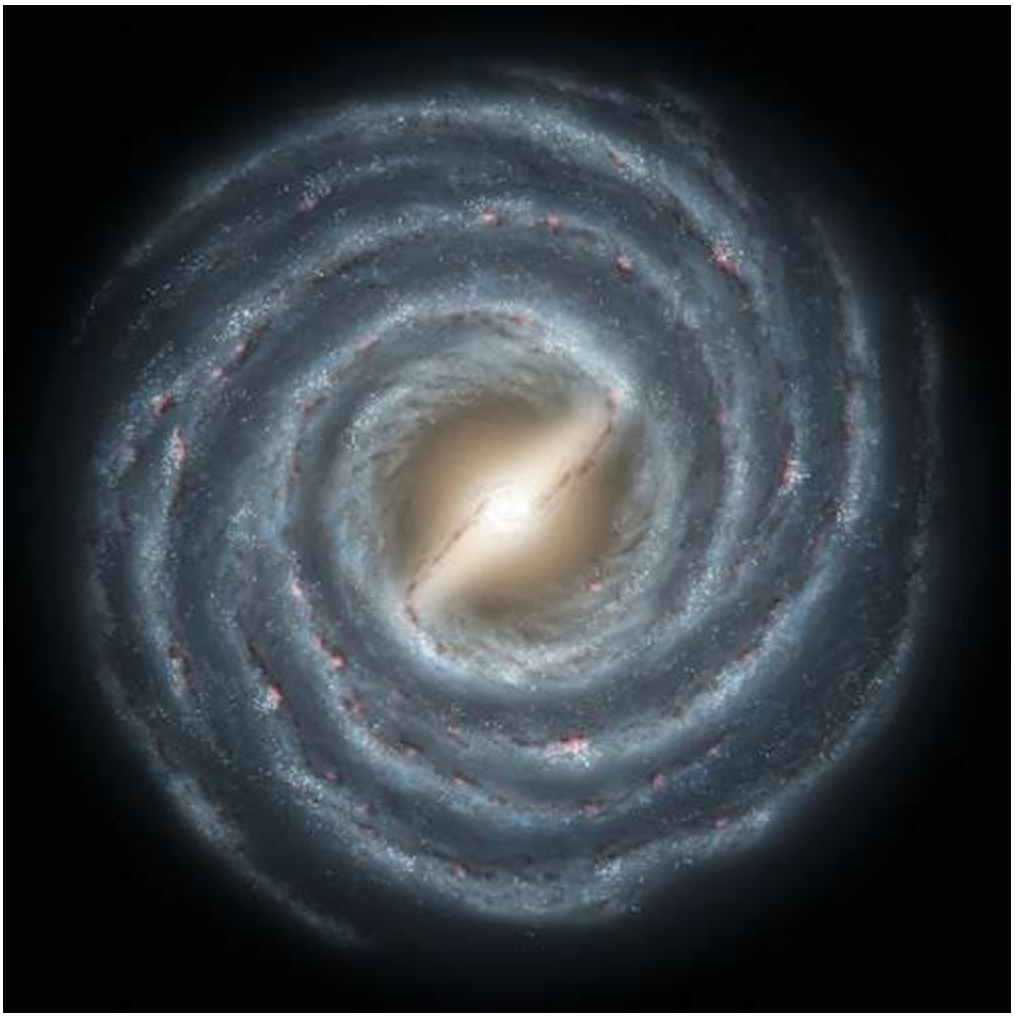


FIGURE: Milky Way Galaxy

FIGURE: Quetzalcoatl

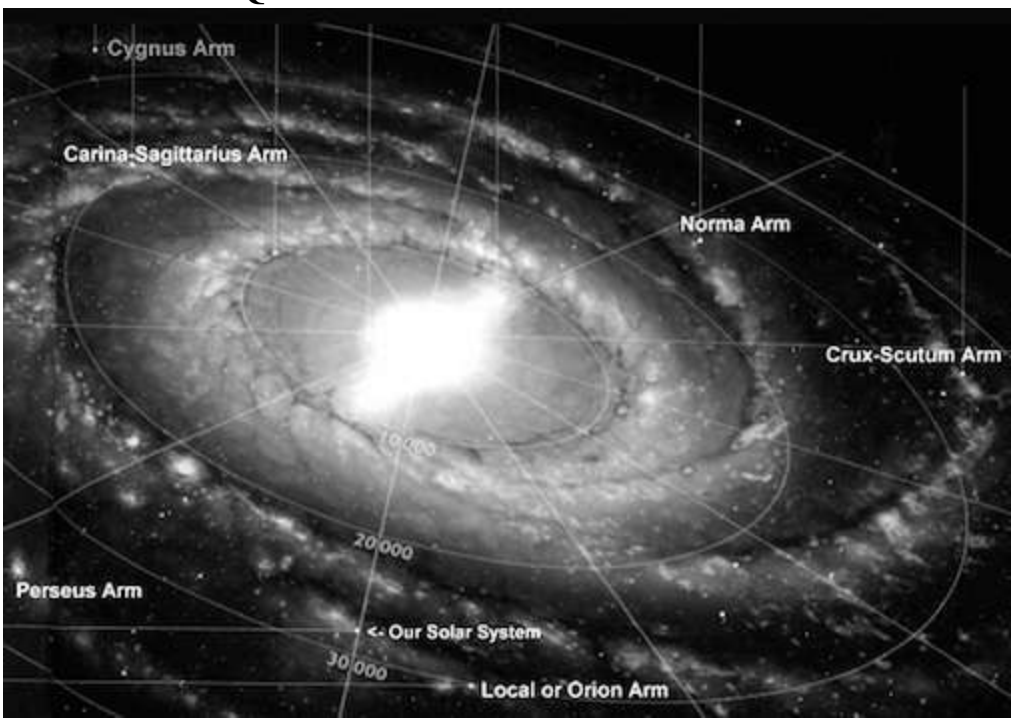


FIGURE: Milky Way Galaxy

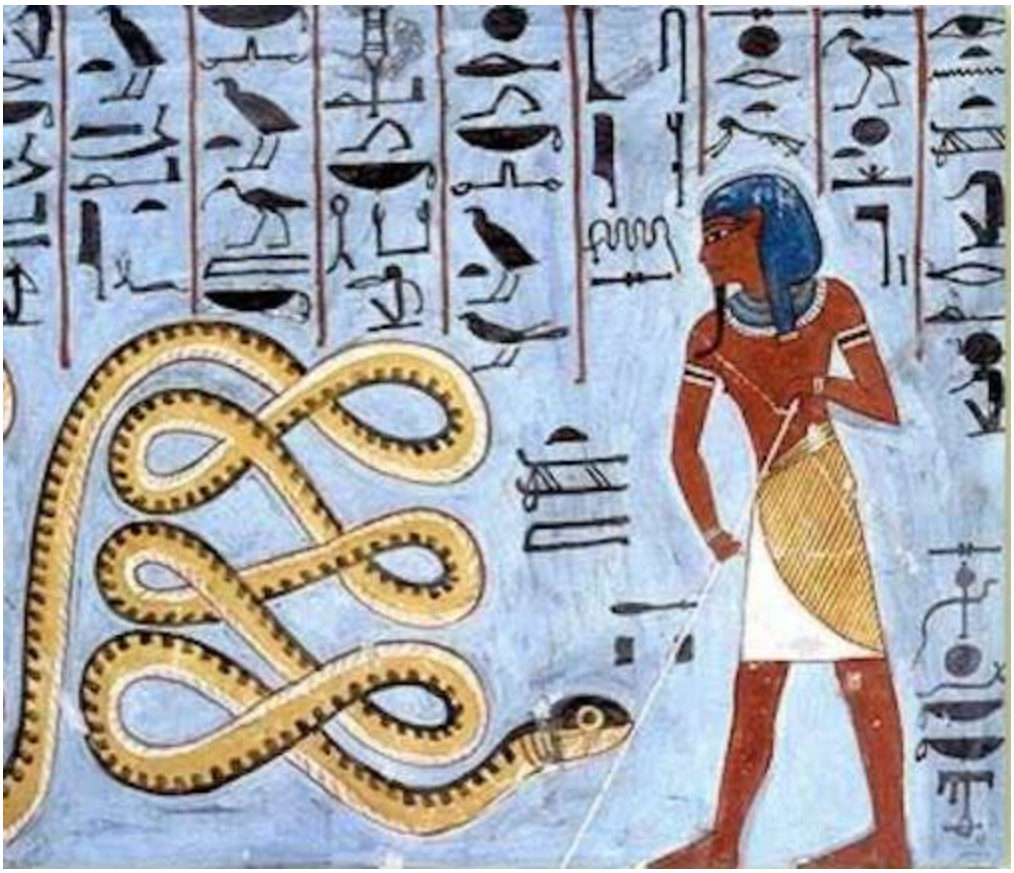


FIGURE: Apep Egyptian Milky Way Galaxy

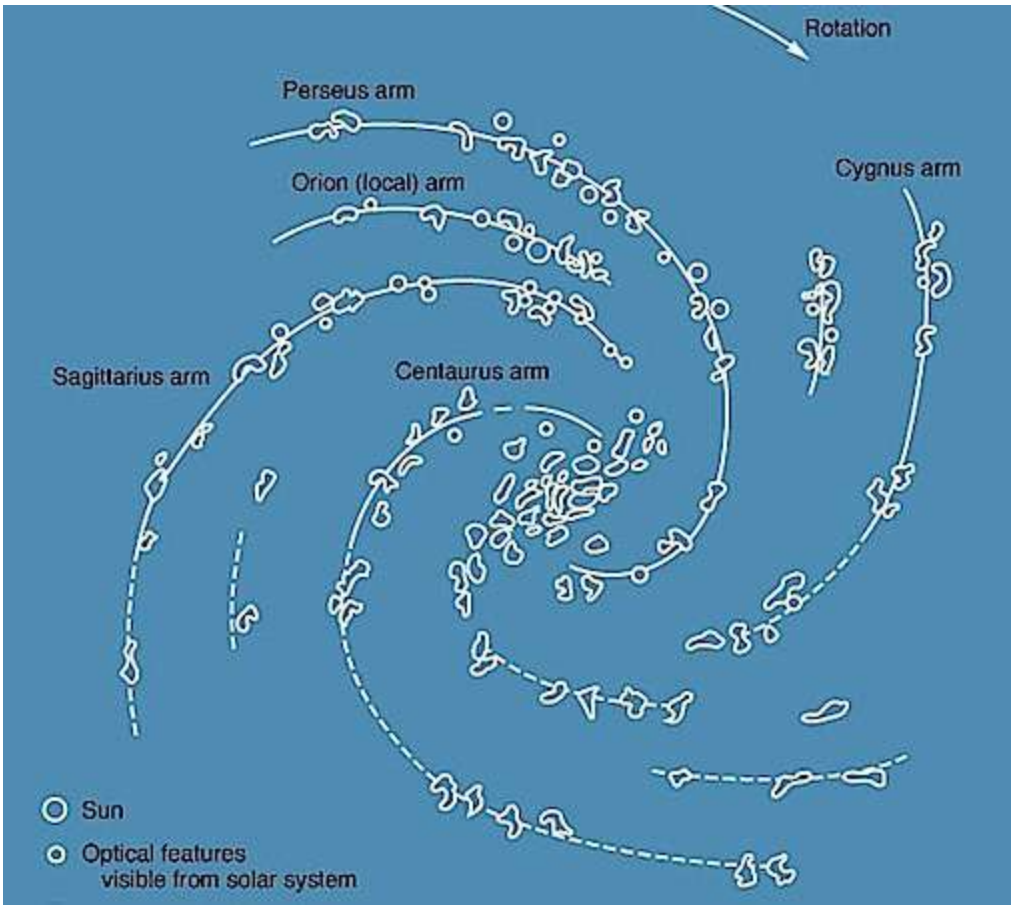
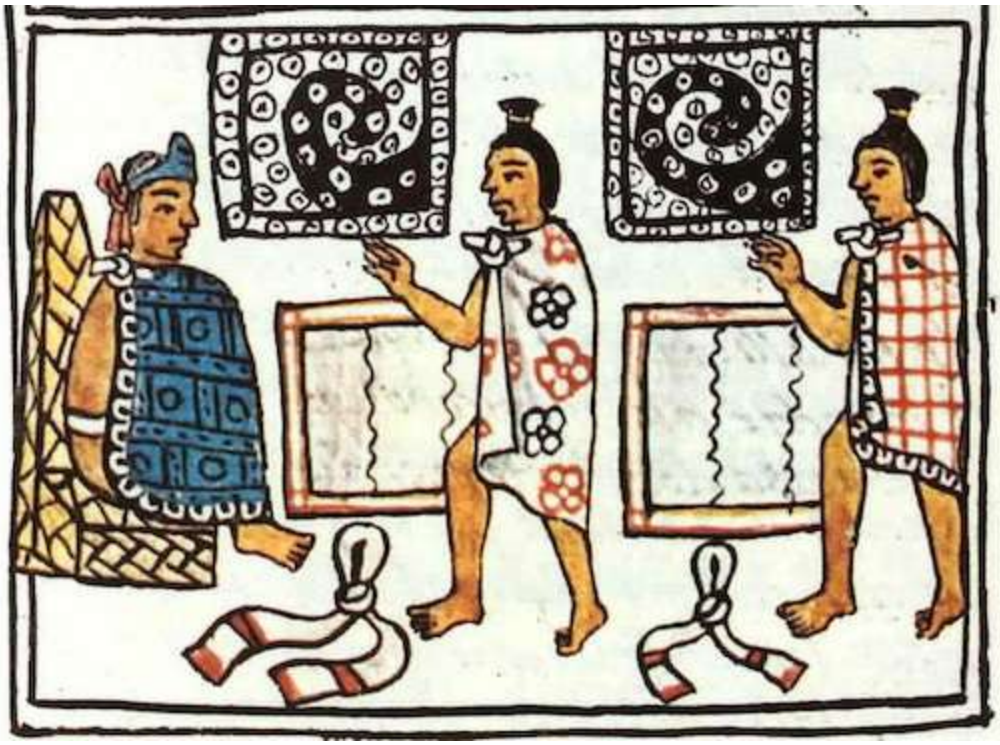


FIGURE: Milky Way Galaxy



FFIGURE: Aztec, Quetzalcoatl / Galaxy

The Cosmic Clock and the Equinox

The priests were scientists, mathematicians, and astronomers who believed by studying the movements of the stars and cyclic cosmic events, that they could scientifically predict what would occur in the future, as based on what has transpired in the past (Coe, 2001; Nigel, 1990; Thompson, 1993).

According to the Mayan/Aztec Calenders, cosmic cycles and each new age are linked to a cosmic clock, with the ticking of the hands, marked by the sun, as it rises in a different house of the 12 constellations on the equinox and solstice every 2,160 years; a precessional calendar that, in total, is 25,776 years in duration. In the year 2012, the cosmic clock, and the rising sun, marked the beginning of a new age ruled by Leo and Aquarius and the death of the previous age which was governed by Pieces and Virgo for the previous 2,160 years.

According to the Mayan and Aztec calandars, the clock has come not full circle, but half circle, for 13,000 years ago the cosmic clock marked time by the rising sun in the constellations of Leo on the day of the on Spring

Equinox and Aquarius on the Autmn equinox. Twenty six thousand years ago, the cosmic clock marked Aquarius on the day of the Spring Equinox and Leo on the Autmn equinox as is the case since 2012, having come full circle.

The Mayan priests devised a calendar which included a "sacred year," the tzolkin of 260 days, and which was separated into 13 months of 20 days each. As we shall see "13" is a precessional number related to the cyclic movement of the cosmic clock and the onset of new ages and the ending of old ages. In addition, they devised a calendar based on the "Long Count" which incorporated their beliefs about the future and the past (Wright, 1991).

This Long Count Calendar was in turn based upon the even more ancient bar-and-dot calendar devised by the Olmecs. The Olmecs bar-and-dot calendar—with a current starting date of 8/13/3113 B.C. (4 Ahau 8 Cumku) —predicts that the onset of the new age of Aquarius and the the next great cosmic cycle began on December 23, 2012 (4 Ahau 3 Kankin). 2012 is also the date given by the Mayan and Atec calendars for the onset of the new age and the ending of the last age.

THE PYRAMIDS: HEAVEN ON EARTH

The Pyramids of Kukulkan

Kukulkan, the "feathered Serpent (also known as Quetzalcoatl by the Aztecs) was the Great God of the Maya--a god that coiled through the cosmos according to specific cycles and whose movements and coming and goings coincided with cosmic rebirth, and destruction. The Mayas, in honor of their god, and to track and record his movement through the cosmos, erected an observatory, the Temple of Kuklukan, located in Chinchen Itza, in northern Yucanta, Mexico.

Figure: Kuklukan

The Temple of Kuklukan, towers nearly 100 feet, and forms a perfect four sided ziggurat, a pyramid, with four stairways with 91 steps each. Coupled with the last step, the threshold to the top platform, the total steps come to 365 which corresponds with the number of days in a solar year.

The Temple of Kuklukan, was constructed with astronomical-geometric precision. The northern staircase was also designed to react to the sun, twice a year, by giving rise to the illusion of a giant serpent undulating across the steps. The illusion of a slithering snake lasts for a period of 3 hours and 22 minutes on the day of the spring and autumn equinoxes.

The Pyramids of Teotihuacan

Like the 3 great pyramids of Egypt, the pyramids of Teotihuacan appear to serve as a terrestrial map of the heavens. Teotihuacan is notable not only for its Pyramid of the Sun, but for its Pyramid of the Moon, the Pyramid of Quetzalcoatl, and the "Citadel," all of which form an axis referred to as the "Street of the Dead." The orientation of the "axis" however is slightly off center. The "Street of the Dead" is inclined 15 degrees by 30 degress east of north. The design is believed to have been purposeful and based on astronomical alignments which form a map of the heavens (Harleston, 1974;

Nigel, 1990, Thompkins, 1987), “the sky-world where dwelt the deities and spirits of the dead” (Thompkins, 1987).

Figure: Teotihuacan

It has also been determined that Teotihuacan may have been designed to serve as a scale model of the solar system, with the center line of the Pyramid of Quetzalcoatl representing the position of the sun, with the temples and pyramids of the “Street of the Dead” denoting the precise orbital distances of the outer planets, i.e. Pluto, Neptune, Uranus, Saturn, Jupiter, and the asteroid belt (Thompkins, 1987).

What is even more striking is that Uranus was not “discovered” by Western scientists until 1787, Neptune in 1846, and Pluto in 1930. The “Street of the Dead” and its temples and pyramids appear to be at least 2000 years old (Nigel, 1990).

How did the ancients discover the presence of the outer stars? In the same manner as modern astronomers: Through mathematical calculations.

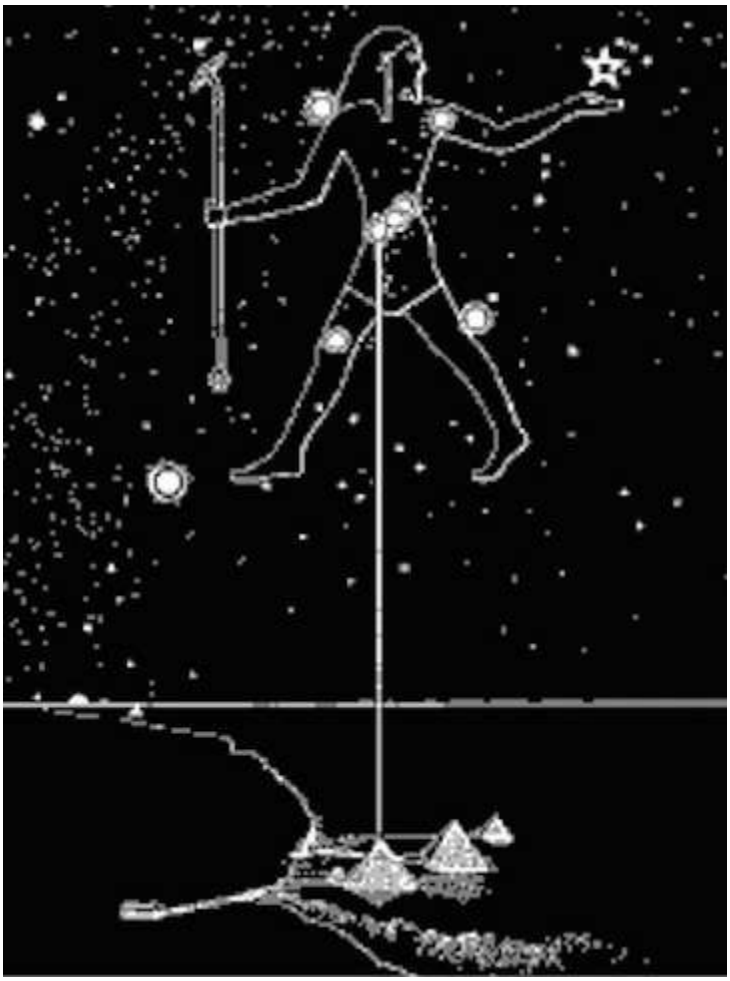
The city of Teotihuacan was a center of scientific study. It was believed by the “place of the gods” where the gods would gather. This included the god Huehueteotl—the god who gave life its beginning and who formed the first woman and man—humans who were also part god (Nigel, 1990).

However, the gods were associated with the cosmos, the Milky Way galaxy, and the stars and planets.

Figure: Teotihuacan

The Pyramids of Giza and the Belt Stars of Osiris

The three great Egyptian pyramids of Giza appear to have been constructed to form a terrestrial map of the heavens, specifically, the three belt stars of the constellation of Orion and thus the house of Osiris. The three great pyramids are oriented closely together, and although the four corners of each pyramid point due East, West, North and South are oriented along an axis which mimics the three belt stars of Orion (Bauval, 1994).



As pointed out in 1994 by Robert Bauval, a Belgian construction engineer, the three pyramids of Giza, are aligned in the exact orientation and interrelationship of the three belt stars. Like (the lower) two of the three pyramids (Khufu, Khafre), the lower two belt stars, Al Nitak and Al Nilam, form a perfect diagonal. However, like the upper pyramid (Menkaure), the third, upper star, Mintaka, is offset slightly to the East.

According to Bauval: “It is really quite obvious that all these monuments were laid out according to a unified plan that was modeled with extraordinary precision on those three stars. What they did at Giza was to build Orion’s Belt on the ground.”

Specifically, when mapped against the Orion Constellation, it is apparent that the Great Pyramid of Khufu occupies the same position as Al Nitak, whereas the Pyramid of Khafre occupies the same position as Al Nilam, whereas the Pyramid of Menkaure occupies the position of Mintaka—moreover, it has been argued that their position most closely matches the belt stars 12,500 years ago: on the same date that Orion’s Belt was at its lowest altitude in the precessional cycle. The figure of 12,500 years ago also corresponds to a date which marks the point at which the 3 belt stars began their upward cycle.

“At 10,450 BC—and at that date only—we find that the pattern of the pyramids on the ground provides a perfect reflection of the pattern of the

stars in the sky. I mean it's a perfect match— faultless— and it cannot be an accident" (Bauval, 1994)

The three pyramids of Giza not only serves as a terrestrial map of the Orion Constellation, but by their differences in size, also reflect the different magnitudes of these three belt stars (Bauval, 1994). In addition, other structures on the Giza plateau correspond to the location and interrelationship of the stars of the Orion Constellation, and thus provide a map of the heavens.

THE PYRAMIDS: EARTH IN HEAVEN

Although one may speculate as to their meaning, the evidence clearly demonstrates that there was an objective, scientific, and astronomical basis for the design and construction of the pyramids of Egypt and old Mexico—an objective scientific basis which explains why there are so many similarities between the religious structures erected by people from completely different cultures and living on separate continents, thousands of years ago. The objective similarities are due to their being modeled on the same heavens and based on the same science.

For example, the Teotihuacan Pyramid of the Moon is shorter than the Pyramid of the Sun. However, their summits are level. Similarly, in Egypt, the summits of the Great Pyramid and the Pyramid of Khafre are the same, although the Khafre pyramid is shorter. This was accomplished by building the Pyramid of the Moon and the Pyramid of Khafre on higher ground (Smyth, 1990).

The pyramids of Giza and the pyramids of Teotihuacan, also incorporate, and in the same way, the value of pi. Pi is the constant that is multiplied by the diameter of a circle to give its circumferences (Harleston, 1974).

The area of the Great Pyramid's base (3023.16 feet) divided by twice its original height (481.3949 feet) gives the figure 3.1400000+ (pi). In addition, the ratio between its height and perimeter is the same as the ratio between the circumference and radius of a circle, i.e. 2 pi. And, if we multiply the height of the pyramid by 2 pi, we get the perimeter of its base.

FIGURE: Teotihuacan Pyramid of the Moon and Sun

FIGURE: Pyramids of Giza

The Pyramid of the Sun has a gentler slope compared to the pyramid at Giza, 43.5 vs 52 degrees and it is not as tall, 233.5 feet vs 481.3949. However, its base is almost the same, 2932.8 vs 3023.16 feet. Even so, the pi formula can be applied to the Pyramid of the Sun (Harleston, 1974). Its base divided by twice its height is equal to two pi, i.e. 6.2800. Its base divided by four times its height is equal to one pi, i.e. 3.1400... And, if we multiply the height of the pyramid by 4 pi, we get the perimeter of its base.

The builders of the pyramids of Egypt and ancient Mexico were well

versed in geometry and astronomy and knew the relationship of the radius to its circumference. They knew the circumference of the Earth, and the distance of the center of the Earth to the poles. For example, the ratio of the Great Pyramid's altitude to its perimeter is the same as that of the polar radius of the Earth to its circumference: 2 pi, whereas the same ratio when applied to the Pyramid of the Sun yields the same figure if divided by two.

In fact, as determined by Charles Piazzi Smyth (1990), the Astronomer-Royal of Scotland, the Great Pyramid incorporates and reveals the distance of the Earth from the sun when its height is multiplied by the proportion of its height to its width, that is, ten to the ninth power.

In addition, the height of the Great Pyramid is 1:43,200 of the polar radius of the Earth and the perimeter of its base is 1:43,200 of the Earth's equatorial circumference. In other words, by multiplying the base and height of the Great Pyramid by 43,200 one can arrive at an astonishingly close approximation of the dimensions of the Earth (Smyth, 1990).

The builders of the Great Pyramid "had determined the shape of the Earth which they knew to be a true circle, its size, its precise circumference, the geographical distance from the equator to the poles, the fact that the Earth is flattened at the poles, degrees of latitude and longitude to within a few hundred feet, the fact that they were shorter at the equator and longer at the poles, and the exact distance of the Earth from the sun. They had designed the pyramid's base to correspond to the distance the Earth rotates in half a second" (Funrneaux, 1987, p 17). The same can also be said of the builders of the Pyramid of the Sun (Harleston, 1974).

In summary: the Great Pyramids of Egypt and Mexico, appear to have been built in accordance with precise geometrical and astronomical laws to serve as a map of heaven, and to record the dimensions of Earth and the duration of the solar year. The Great Pyramid and the Pyramid of the Sun not only served as scale models of this planet, but could be used to record the movements of the Earth around the heavens in relation to the sun and the stars—the dwelling place of the gods. Moreover, they may have been used to predict or signify the death of old gods and the birth of new gods as related to which house the sun rises on the equinox.

THE DESTRUCTION OF ANCIENT KNOWLEDGE

"The mind has lost its cutting edge, we hardly understand the Ancients."

—Gregoire de Tours, 6th century

The astronomer priests of the ancient world made a number of startling discoveries about the cosmos, our solar system, and the Earth—startling because thousands of years would pass before modern western scientists would make the same discoveries.

Much of the science of the ancient world has been lost through natural and cosmic catastrophes, or destroyed by the hand of man. In consequence, we know almost nothing about the ancient past, and much of what we do know, is dismissed by "experts" who cloak their ignorance with derision and laughter.

We suffer from a collective amnesia as to ancient civilizations and those events which transpired six thousand years ago, ten thousands years ago, and so on.

This amnesia is in large part, purposeful, for the books detailing the pre-deluvial past, and the treasures of knowledge the ancients had acquired, have been deliberately destroyed by priests, princes, and conquering kings.

In 213 B.C., the Emperor Chou-Houng-Ti, destroyed a hundred thousand books. When the library of Alexandria was burnt, tens of thousands of manuscripts went up in flames. When Pergamo was burned to the ground, 200,000 ancient books were reduced to soot and ash. And what of the ancient books from the library of the Temple of Solomon, from the sanctuary of Phtah of Memphis, the libraries of ancient Athens? Dust. Ashes and dust, of which only fragments remain...fragments and those few ancient stone tablets, temples, and pyramids which escaped the destructive hand of man.

Yet, despite the destructive efforts of the conquerors of old, and the priests of the medieval church who preached: "Thou shalt not know," we have learned that knowledge is not a sin, and that the ancients were men of great wisdom who had studied and learned from the stars.

Copernicus stated explicitly in the preface to his works, that it was from his reading of ancient authors that he learned of the movements of the Earth. And likewise, Newton and Galileo openly admitted their debts to the scientists of old. Indeed, Newton believed that the ancients had learned the secrets of the creation, transmutation, and destruction of matter, as well as the secrets of the stars.

"If I have seen further, it is by standing on the shoulders of giants" —

Newton. Newton stood on those ancient shoulders because he desired a clear view of the stars.

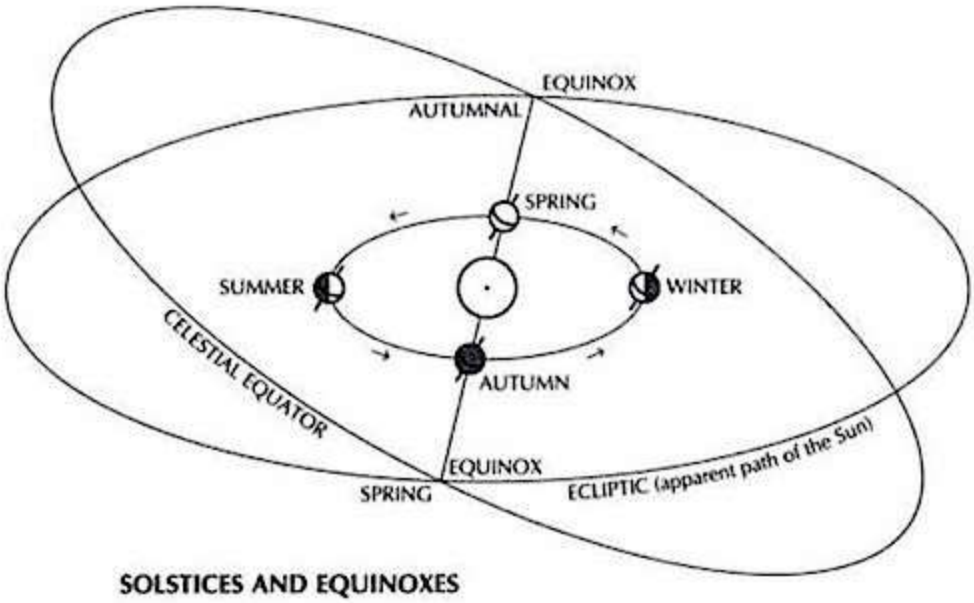
The ancients studied the stars because they believed the future could be predicted by the past, and that time itself was linked to the cyclic movements of the Earth through the heavens. These are not superstitions. Modern day calendars are based on the same principle.

However, whereas modern day calendars are based on the orbit and tilt of the Earth during a 365 day period, the ancients relied not only on a solar calendar, but a precessional calendar that was 25,776 years in duration—a calendar and cosmic clock that also predicts cycles of cosmic creation and destruction, and the birth and twilight of the gods as represented by the stars and the 12 constellations.

PRECESSION AND THE COSMIC CLOCK: THE FUTURE IS THE PAST

The illusion that the Sun moves, from north to south, and then back again, in synchrony with the waxing and waning of the four seasons, is due to the changing tilt and inclination of the Earth's axis, as it spins and orbits the sun. Thus over a span of 12 months it appears to an observer that the days become shorter (winter) and then longer (summer) and then shorter again as the sun moves from north to south, crosses the equator, and then stops (solstice), and heads back north again, only to stop (solstice), and then to again head south, crossing the equator only to again stop (solstice) and head north again.

The two crossings each year, over the equator (in March and September) are referred to as equinoxes. The two time periods in which the sun appears to stop its movement, before reversing course (June and December), are referred to as solstices—the "sun standing still."



SOLSTICES AND EQUINOXES

The sun was recognized by ancient astronomer priests, as a source of light and life-giving heat, and as a keeper of time, like the hands ticking across the face of a cosmic clock.

Because of the scientific, religious, and cosmological significance of the sun, ancient peoples, in consequence, often erected and oriented their religious temples to face and point either to the rising sun on the day of the solstice (that is, in a southwest—northeast axis), or to face the rising sun on the day of the equinox (an east-west axis).

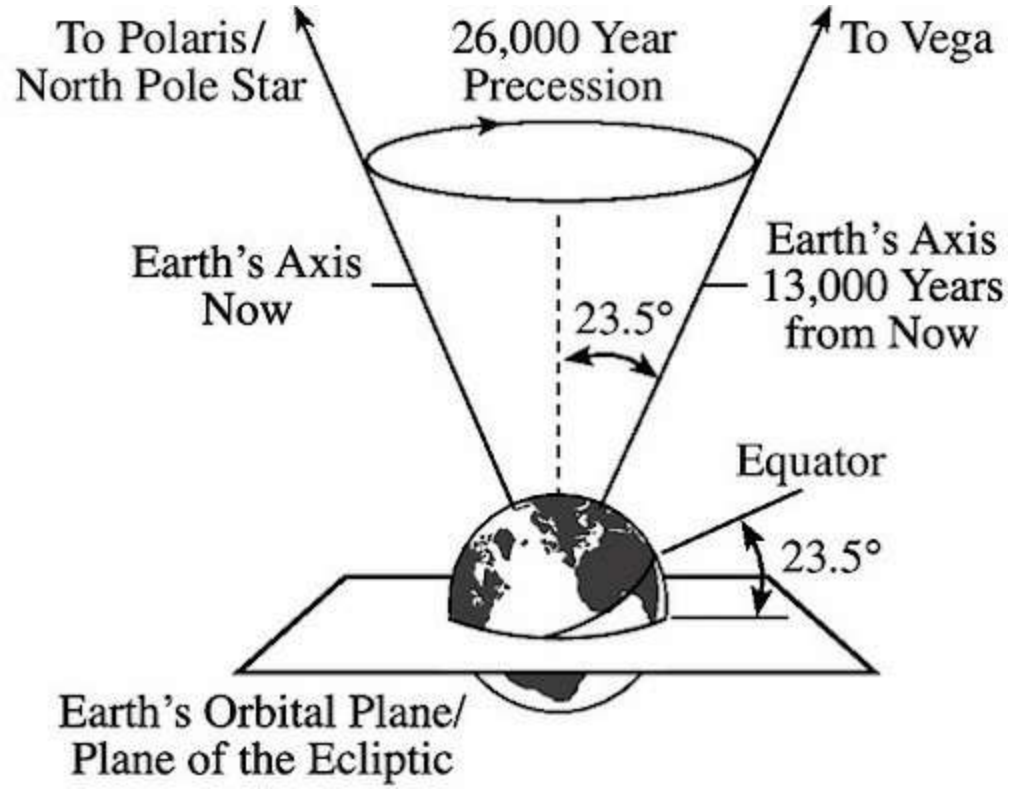
For example, the ancient temples and pyramids in Egypt were oriented to the solstices, whereas the Temple of Solomon faced the rising sun on the day of the equinox.

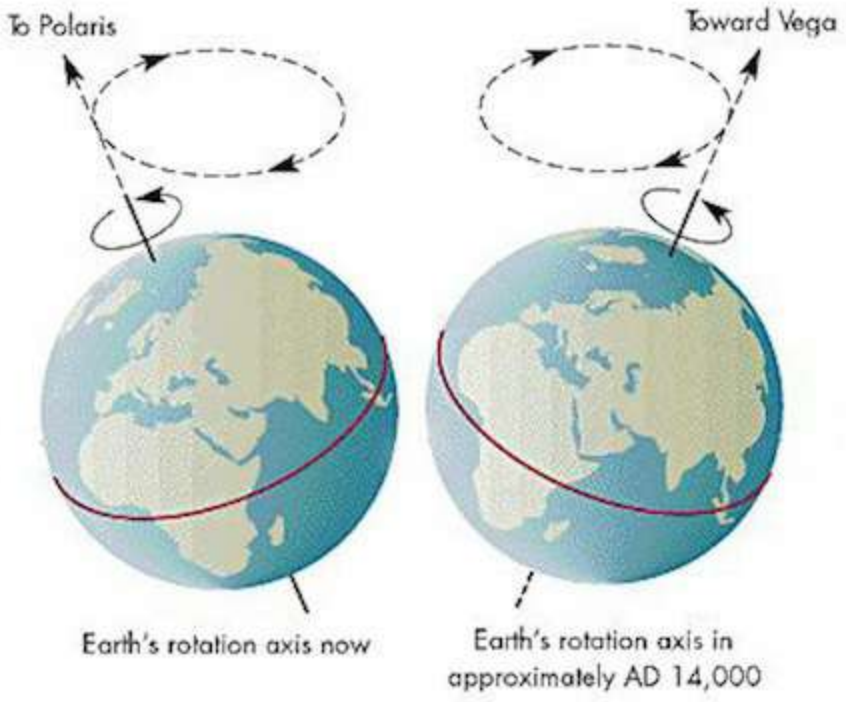
Over eons of time ancient peoples were forced to slightly alter the orientation of their temples, due to precession and cyclic changes in the inclinations of the Earth's orbital path (the ecliptic) and in its axis (obliquity). For example, the angle of the tilt of the Earth was 24 degrees in 4,000 BC, but has been reduced to 23.5 degrees in modern time. Eventually the angle of the tilt will reverse course and assume a greater angle of inclination.

The gravitational influences of the sun and the moon, coupled with the angle of the tilt of the Earth—that is, the axis of the orientation of the north and south pole—also causes the planet to slowly wobble as it orbits the sun—a phenomenon referred to as "precess."

As will be detailed, the priests of antiquity discovered precess, thousands of years ago. The Earth spins at the rate of 1000 miles per hour (as measured from the equator) and orbits the sun at 67,000 miles per hour. This orbital and circular motion generates incredible centrifugal forces which cause the Earth's equator to bulge outward whereas the poles are somewhat flattened, thus giving the planet a (sideways) egg-like shape of an oblate spheroid. However, this extra mass at the equator also serves to keep the Earth steady on its axis as it orbits the sun—like the outer rim of a spinning top or gyroscope.

It is said that this oblate spheroid shape of the planet was first discovered by Sir Isaac Newton. However, almost a thousand years before Newton, Muhammad describe the Earth as "shaped like an egg." Muhammad was correct.





And because of the gravitational influences of the sun and the moon, coupled with centrifugal forces, the angle of the tilt of the Earth slowly alters over time as it spins and orbits the sun. The alteration in the tilt of the Earth is cyclic, and over the course of the last 41,000 years, the tilt has been reduced by 1.5 degrees, i.e., from 25 degrees to a little less than 23.5 degrees.

Because the angle of the tilt—that is, the orientation of the north and south pole—alters over time, and t he retardation of the Earth's orbit, and thus due to a cyclic phenomenon referred to as "precession," over time the north pole "points" at different stars, and the sun rises in different constellations, like the movements of the hand of a clock.

Precession

The ancient astronomer priests discovered "precession" thousands of years before modern western scientists (Santillana & von Dechen, 1969; Sellers, 1992).

There is a cosmic clock-like regularity to "precession"—like the hands moving around the circular face of a clock.

At present, the north pole points at the "pole star" referred to as Polaris (alpha Ursae Minoris). Five thousand years ago the north pole pointed at

alpha Draconis. Thirteen thousand years ago it pointed towards Vega.

In thirteen thousand years, the north pole will again point at Vega. Twenty thousand years from now it will again point at alpha Draconis. And, in 25,776 years it will again point at Polaris.

Thus, it takes the Earth 25,776 years for the hands of the cosmic clock to make a complete circular rotation and to complete a full precessional cycle.

The Four Seasons and the Sign of the Cross

Because the orientation and tilt of the Earth also shifts as it orbits the sun, the amount of sunlight the Earth receives varies during the course of a single orbit, but in a predictable, clock-like fashion (Hays et al., 2006). As noted, this change in the tilt of the planet gives rise to the four seasons and what is referred to as the winter and summer solstices and the autumn and spring equinoxes.

FIGURE: Quetzalcoatl/Kukulkan holding the sign of the cross, the four corners, representing the equinox and solstice, and the surrounding cosmic clock

To honor the sun god, ancient peoples oriented their temples and monuments to face the rising sun on one of the four days believed to have

cosmic significance, on the morning of the first day of Summer, Winter, Spring, or Fall, also known as the Winter and Summer Solstice, and the Spirng and Fall Equinox. The four seasons, marked by the solstice and equinox, forms a cross, thereby giving the cross cosmic significance.

FIGURE: Egyptian Key of Life.

In the northern hemisphere, during the winter, the tilt is away from the sun, with the greatest degree of that tilt occurring on December 21. December 21 marks the winter solstice and is the shortest day of the year. By contrast, the greatest degree of tilt toward the sun occurs on June 21, the summer

solstice, which is the longest day of the year. The equinoxes, March 20 and September 22, are the two days of the year which are of equal length.

There are two solstices, and two equinoxes, and these four events, represent the four corners of Earth and the cosmos, are are symbolized by the sign of the cross. This is why the sign of the cross appears across cultures and ages.

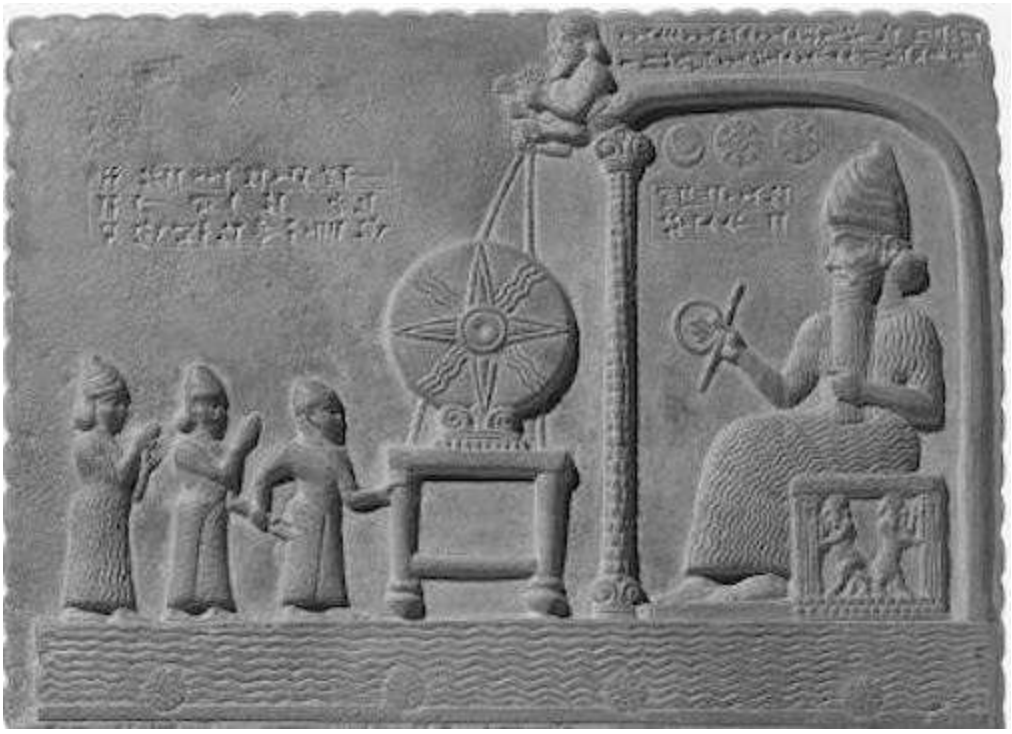
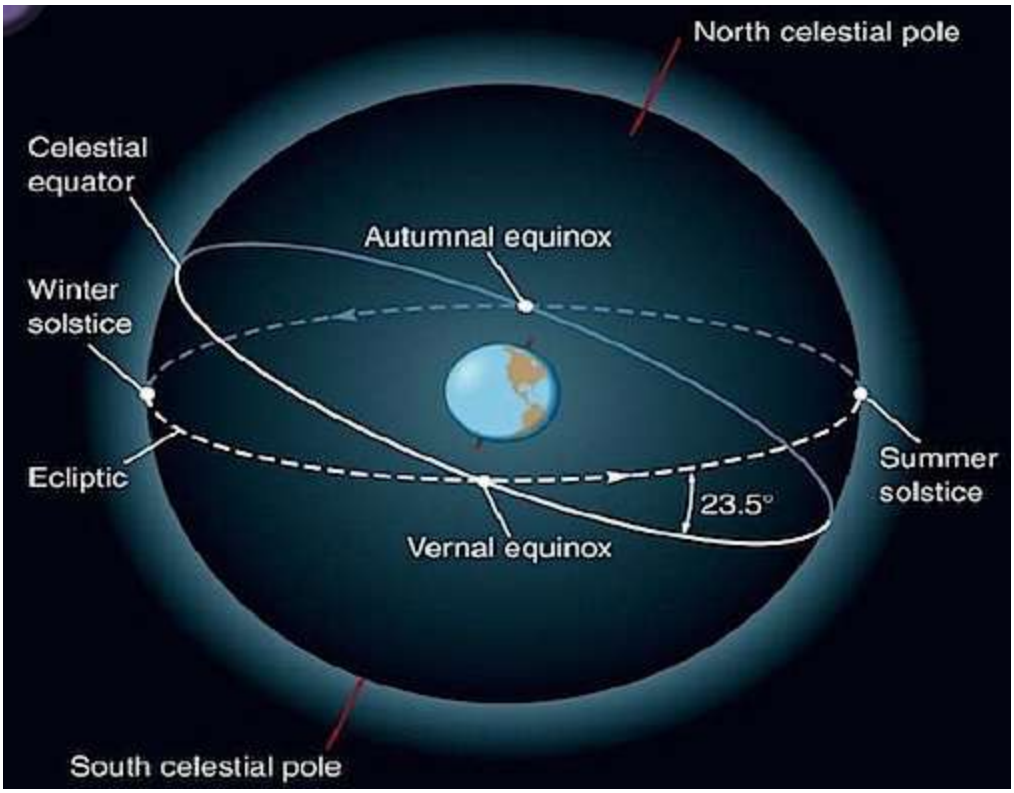


FIGURE: Babylonian

FIGURE: Missipian Native Pendant

Thus, the cosmic clock-like cycle of the Earth's orbit around the sun, gives rise to four significant astronomical events which the ancients deemed to be of the highest significance. However, as the ancients discovered, the equinoxes also undergo precession, and, precession has a repetitive, clock-like predictability (Santillana & von Dechen, 1969; Sellers, 2002).



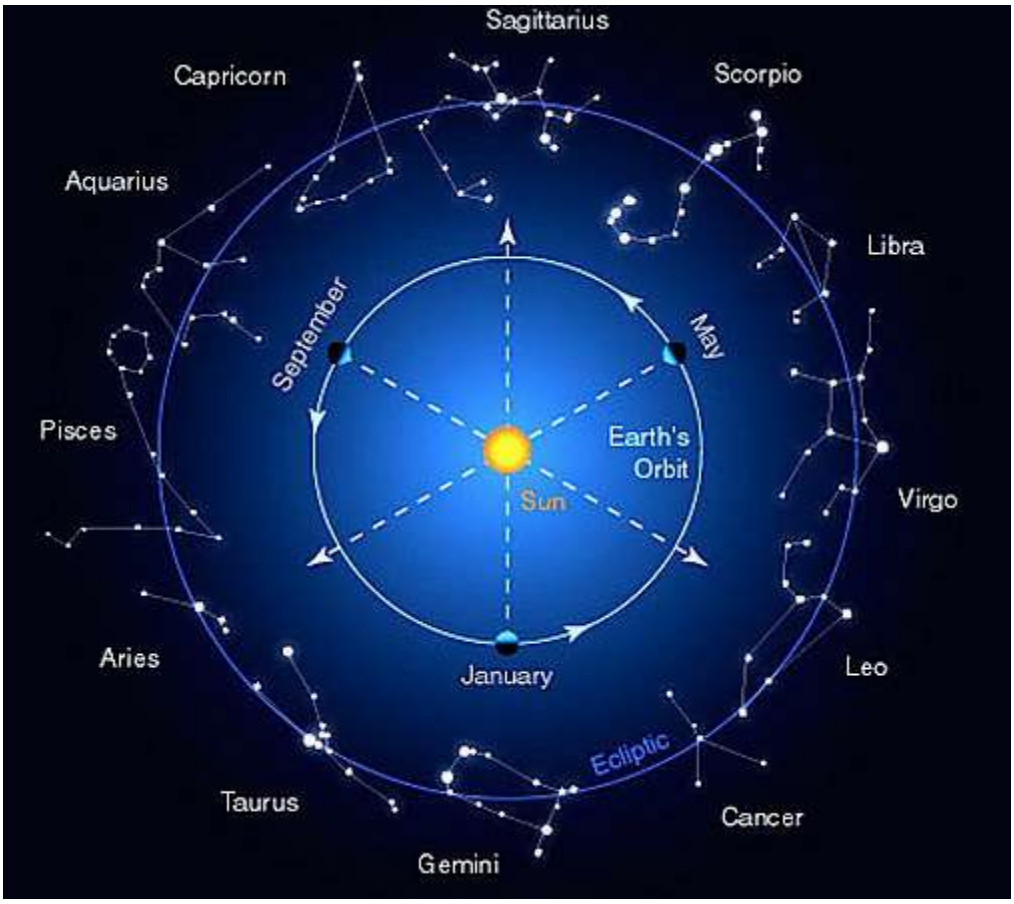
Worship of the sun is a custom that was embraced by most cultures throughout ancient history. The sun, like the 12 constellations, was viewed as a god. As the Earth orbits the sun it forms an imaginary circle referred to as the ecliptic. There is, however, a second, outer imaginary circle, an outer-ring that forms a belt that surrounds the Earth's ecliptic orbit. This outer circle is ringed with stars that form the 12 constellations of the zodiac: Aquarius, Pisces, Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricorn. The 12 constellations, although differing in size, are evenly spaced, occupying positions in the heavens that could be likened to the numbers on the face of a clock. During the course of a solar year, the sun passes through each constellation which lie along the ecliptic, every 30 days, much like the hands of a clock marking the 12 hours of a day.

Each constellation occupies a space of 30 degrees along the ecliptic of the Earth's 360 degree orbit around the sun. Thus, as the Earth orbits the sun, every 30 days the Earth faces a different constellation during the morning sun-rise, and thus passes through a different house of the zodiac.

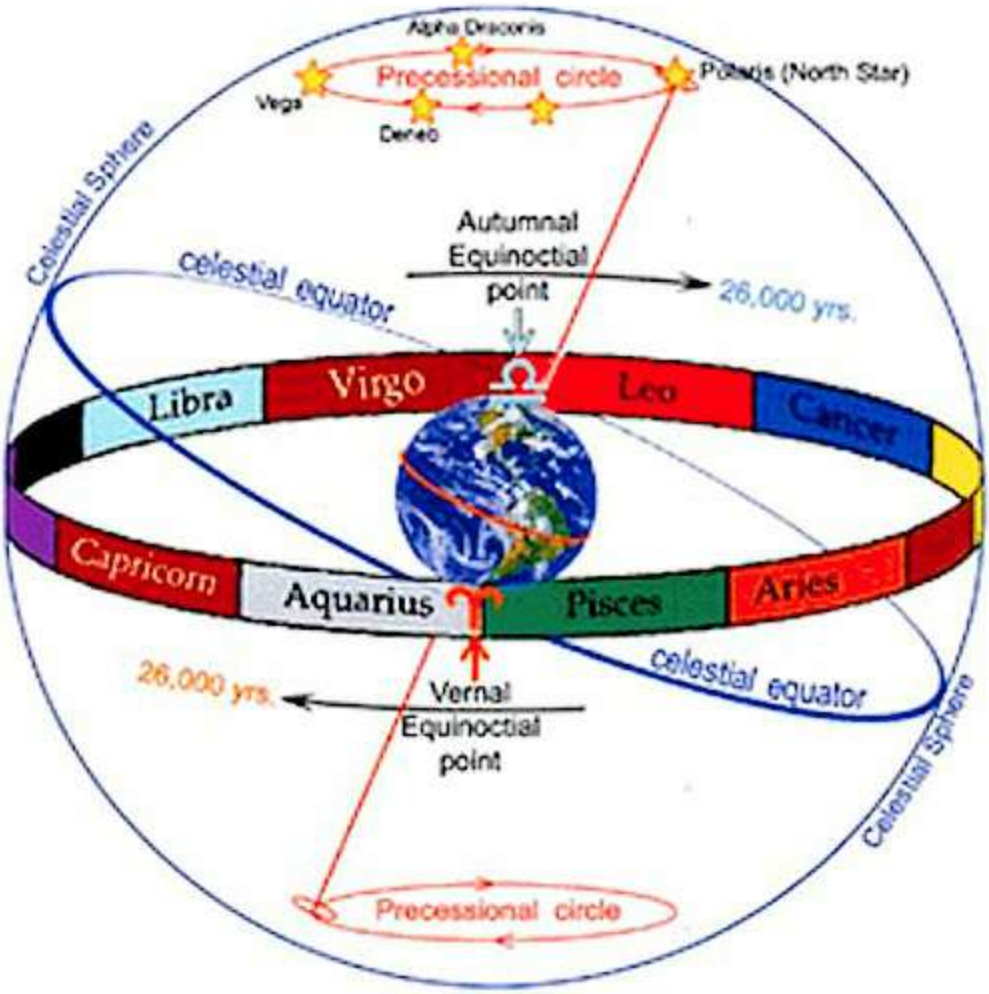
Because the orbit of the Earth gives rise to the illusion of the movement of the sun, the sun also appears to be rising in and passing through a different constellation every 30 days. An observer who watches as the sun rises or sets,

will also see the sun rising or setting in a different constellation, every 30 days.

It is this illusion which led the ancient Greeks and the Medieval Catholic Church to believe that the Earth was at the center of the solar system and that the sun orbited the Earth. The ancient astronomer priests of remote antiquity were not fooled. Thousands of years before the rise of the Greek civilization, these ancient priest/astronomers recognized that the sun was at the center of the solar system, and, they calculated not only precess, but precession (Santillana & von Dechen, 1969; Sellers, 2002).



Because of the clock-like regularity of the changing seasons and the passage of the Earth through all the houses of the zodiac in a solar year, it can be predicted in which house of the Zodiac the sun would rise on any day of the year, including on the mornings of the summer and winter solstices and the spring and autumn equinoxes. These predictions can be made with accuracy for the following year, or even a hundreds years into the future: The future can be predicted mathematically based on the past.

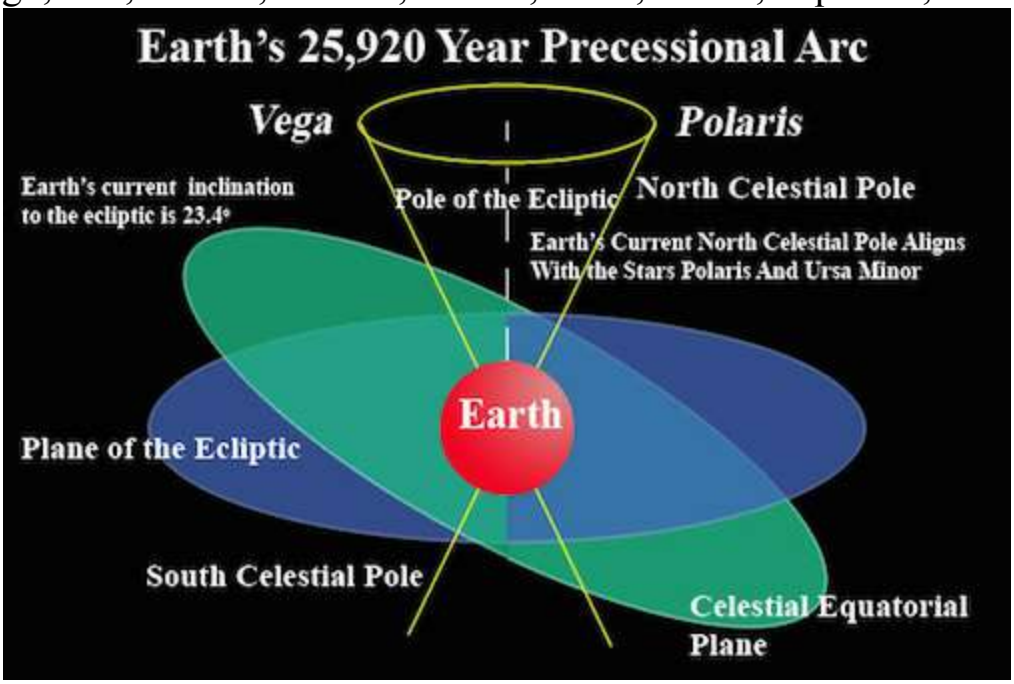


What the ancient astronomer-priests discovered, however, was that over thousands of years of time, and because of precession, the sun slowly changes position, like the hands of a clock. Over thousands of years, the sun begins to rise in a different constellation on the mornings of the summer solstices, and a different constellation on winter solstices and different constellations on the spring and autumn equinoxes (Santillana & von Dechen, 1969; Sellers, 1992).

What the ancient astronomers discovered was that the sun's changing position, like the hands of a clock, pointed out the "hours" of the precessional cycle—a phenomenon referred to as the "precession of the equinoxes." Instead of every 30 days, the ancients determined that every 2160 years the sun would point at a different constellations on the day of the equinox or

solstice. That is, it takes 2160 years for the sun to slowly move from house to house—like the ticking hands of celestial clock.

Due to the retardation of the Earth's orbital movement of 1 degree every 72 years, precession is a counterclockwise, or rather, an anti-clockwise phenomenon. Thus, every 2,160 years the sun rises in the previous house of the Zodiac. That is, the sun appears to move in a counterclockwise direction, such that the hands of the solar precessional clock also move backwards: Virgo, Leo, Cancer, Gemini, Taurus, Aries, Pisces, Aquarius, etc.


Earth's 25,920 Year Precessional Arc
Vega
Polaris
Earth's current inclination to the ecliptic is 23.4°
Pole of the Ecliptic
North Celestial Pole
Earth's Current North Celestial Pole Aligns With the Stars Polaris And Ursa Minor
Earth
Plane of the Ecliptic
South Celestial Pole
Celestial Equatorial Plane

For example, the hands of the solar clock pointed at Aries, 4000 years ago, but slowly moved toward Pisces. For the last 2000 years the hand of the solar clock has pointed at Pisces, but moved slowly toward Aquarius. In 2012 we entered the age of Aquarius.

The ancient priests also determined that the precession of the equinoxes takes 25,920 years to complete its 360 degree circular cycle; i.e. 12 x 2160 years. Although modern "estimates" which gives the number as 25,776 (Hays, et al., 2006), it can still be predicted that 25,920 years from now, the sun will again leave Pisces and will enter the age of Aquarius.

THE DEATH OF GOD: NEW AGE RELIGIONS

The Age of Pieces/Christ and the Virgo/Virgin

As the ancient astronomer priests realized, a single year consists of 365 days. A Great Year consists of 25,920 years. The Great Year, like a single year, consists of 12 houses, but instead of 30 days per house/month, the duration of the time spent in each house/constellation is 2160 years.

It was also believed that as the hands of the cosmic clock shifted from one constellation to the next, this signified the ushering in of a "new world age," e.g., the age of Taurus followed by the age of Aries followed by the (current) age of Pisces, followed by the age of Aquarius; each lasting 2160 years.

However, every beginning is heralded by an ending and the death of a "god." As Aristotle long ago pointed out, in the truly ancient world, the "gods were stars," that is, constellations.

Thus, as the hands of the precessional clock moved from constellation to constellation, each new world age would be associated with the death of an old god and the birth and rein of a new god, who in turn would be directly linked to the prevailing constellation.

For example, the astronomical age of Pisces (the fish) began around the time of the birth of Christ, which is why the fish was and continues to be a symbol associated with Christ and Christianity. However, whereas the sun rose in the house of Pisces during the Spring equinox, it rose in the house of Virgo (the Virgin) in the autumn. Hence, the god Christ, is linked to Pisces and Virgo, i.e. the Virgin Mary

FIGURE: Constellation of Virgo

Again, there are two solstices, and two equinoxes, and a different constellation occupies each of the four, for a 2,160 year period. These four events, represent the four corners of Earth and the cosmos, are are symbolized by the sign of the cross. This is why the sign of the cross appears across cultures and ages.

The Age of The Ram

Due to centrifugal forces which influences and slows the Earth's orbit

around the sun, on the days of the equinox and solstice the rising sun seems to slowly change position relative to the constellations, like the backward ticking of a clock.

Because the Earth slows by 1 degree every 72 years, over a period of 2,160 years, it moves backward by 30 degrees, and therefore the sun begins to rise in a different constellation on the morning of the equinox and solstice. This is known as the precession of the equinoxes.

We are now in the age of Aquarius. For the previous 2,160 years, the sun rose in the house of Pisces on the day of the Spring Equinox. Due to the backwards ticking of the cosmic clock, the Age of Pisces was preceded by the Age of the Ram.

Specfically, beginning around 2,200 BC, and for the next 2,160 years, on the morning of the Spring equinox the sun rose in the constellation of Aries, the Ram. Therefore, in ancient Egypt during the Age of the Ram, the Egyptians worshipped the Ram and numerous statues and monuments were dedicated to the Ram god.

Thus, whereas Jesus is associated with the Age of Pieces, during the Age of the Ram, Egyptians kings, most notably, King Ramses were associated with the constellation of Aries, and numerous statues of the Ram god including those protectively surrounding the image of Ramses, were erected throughout Egypt and as guardians in his temple and mortuary complex. Moreover, Ramses magnificent mortuary temples were built to face the rising sun in the house of Aries, on the first day of Spring.

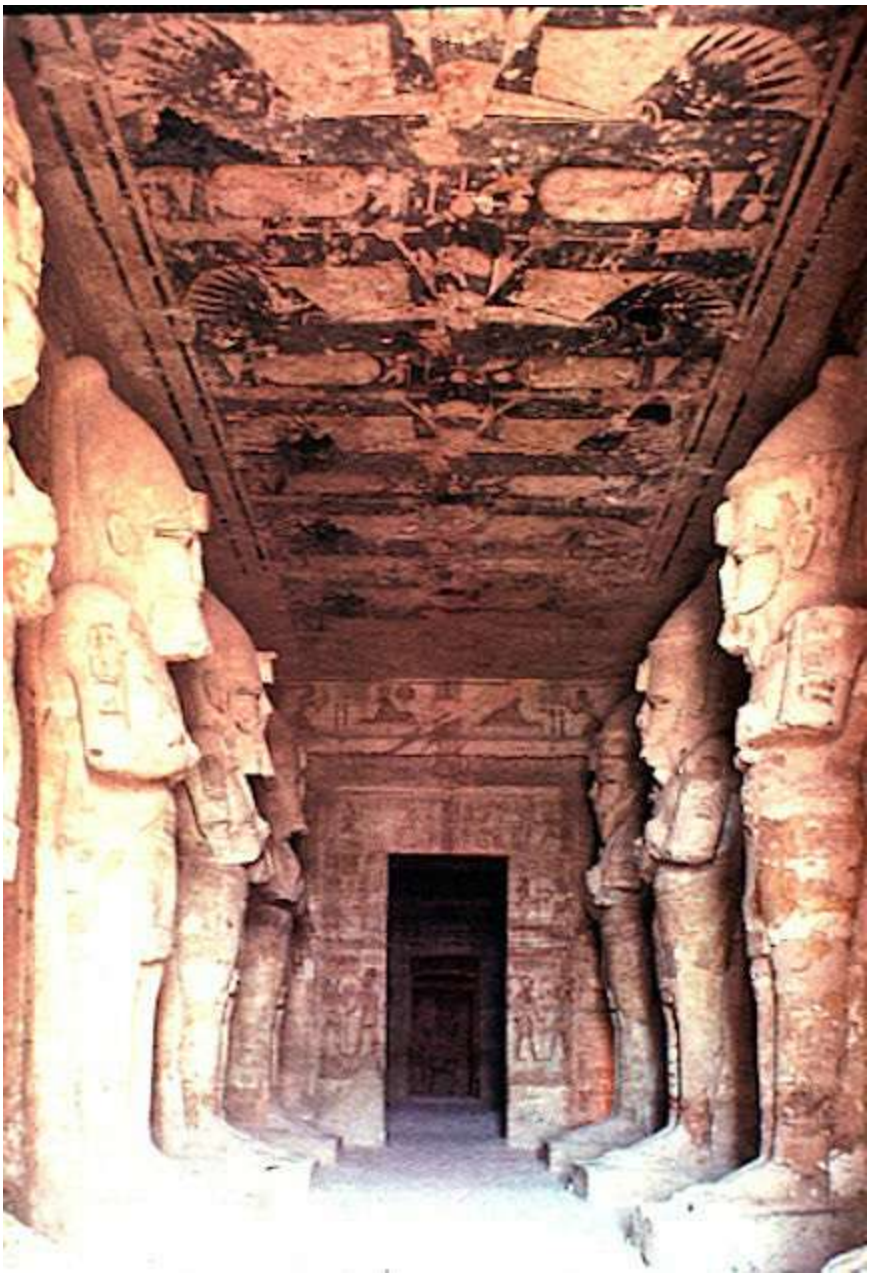


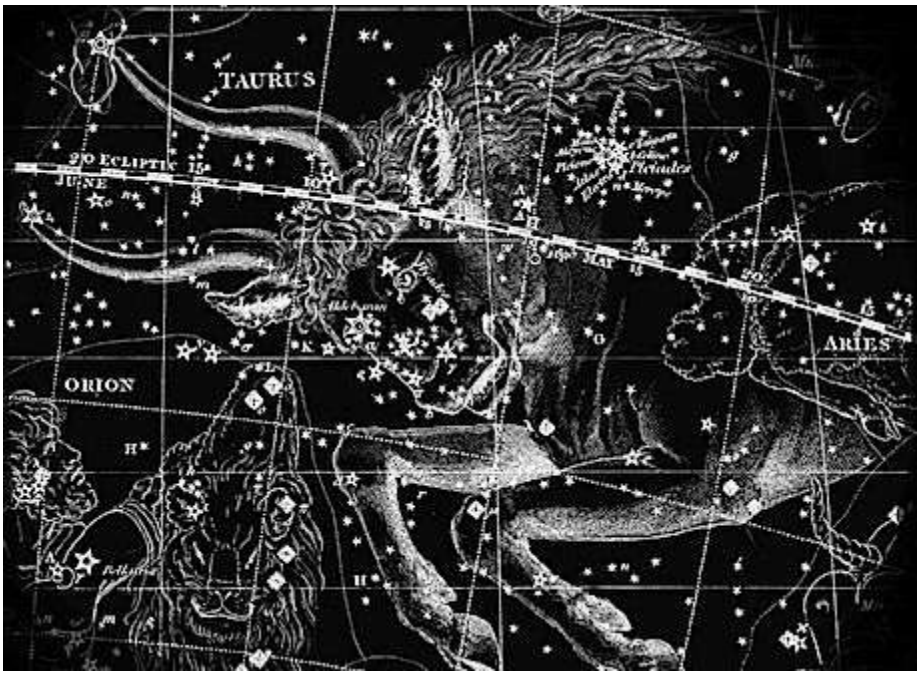
FIGURE: Ramses Mortuary Temple on the Sping Equinox

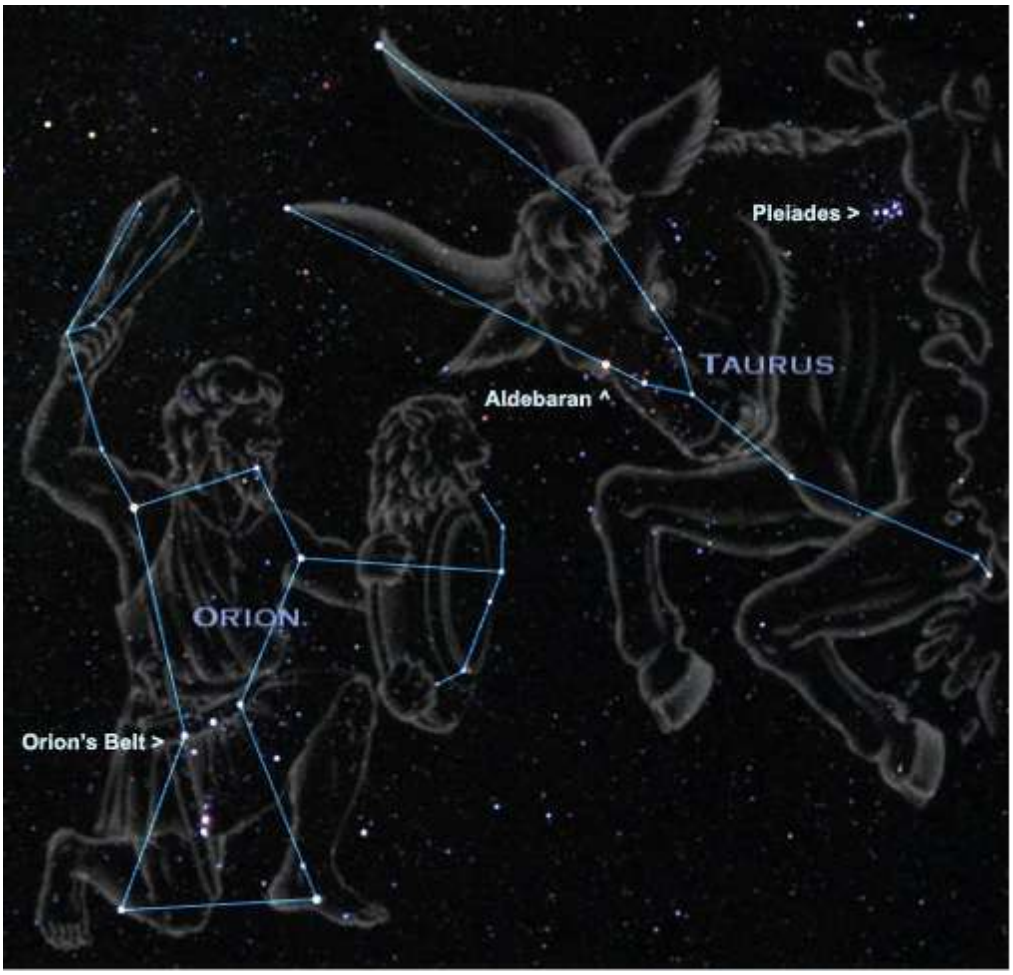
The Age of The Bull

Around the year 2,200 BC, the Age of Aries began. However, for the previous 2,160 years, peoples around the world were paying homage to Taurus, the Bull. The Age of the bull began around 6,000 years ago which is why ancient religions of that period employed the symbol of the Bull, e.g. the Bull-cult of ancient Crete, the Apis bulls of ancient Egypt.

Six thousand years ago the Sumerian civilization was in full flower and the Sun rose in the constellation of Taurus on the spring equinox. The Sumerian lists of the Zodiac begin with Taurus, the bull, and Sumerian stories frequently refer to the Bull of Heaven.

FIGURE: Sumerian depiction of the Bulls of Heaven, with the tree of life, with its four branches representing the two equinox and solstices at the center




Pleiades >
TAURUS
Aldebaran ^
ORION
Orion's Belt >

During the age of Taurus, Egyptian kings and the Egyptian people also paid homage to Osiris, who is linked to the constellation of Orion. According to legend, Osiris, the great cosmic god of the afterlife, had once been a king of Egypt and ruled during a golden age, before the great catastrophe which destroyed much of the world. According to legend, Osiris was murdered by 72 conspirators led by his brother Set in association with the great serpent, Apep.

Thus we see that slate palettes dating from the Age of Taurus, depicts the constellation of Taurus, and link the king of Egypt to the constellation of Orion and the god-King Osiris who ruled during the golden age.

The Narmer plate which is crowned on both side by the Bull, Taurus, and the image of the king which is linked to the constellation of Orion. It has been variably dated to 3100BC and to 4468 BC by some Egyptologists; dates which correspond to the Age of Taurus. However, if the Narmer plate was fashioned in 4468 BCE, it may have commemorating the spring equinox, and the ending of the age of Gemini, the twins: hence the twin bulls.

FIGURE: “Narmer Plate” depicting twin bulls.

THE NEW AGE OF THE RAM AND THE JEWISH RELIGION

“God brought them out of Egypt; he hath as it were the strength of a bull.” Numbers 23:22

“Whereupon the king took counsel, and made two calves of gold, and said unto them: behold thy gods, O Israel, which brought thee up out of the land of Egypt. -Exodus 32.8

The Transition From The Age of The Bull to the Age of the Ram

The Sumerians were largely a Semitic people, and Abraham, the patriarch of modern day Jews and the Jewish religion, hailed from Ur of the Chaldese, a Sumerian city, during the waning days of the Age of Taurus. And like the Sumerians, the ancient Jews worshipped a number of gods, including Taurus, the bull—also known as the "Golden Calf."

Moses appeared upon the scene during the new age of Aries: the ram—also known as the god of war. But, when he led the Jews from Egypt to the lands he claimed had been promised to them by the God of Abraham, Isaac and Jacob, they were not accepting of the new god and repeatedly rebelled in favor of the old gods, the gods worshipped by their fathers, and their kings:

"When the people saw that Moses was so long in coming down from the mountain, they gathered around Aaron and said, "Come, make us gods who will go before us. Aaron answered them, "Take off the gold earrings that your wives, your sons and your daughters are wearing, and bring them to me." So all the people took off their earrings and brought them to Aaron. He took what they handed him and made it into an idol cast in the shape of a calf. Then they said, "These are your gods, O Israel, who brought you up out of Egypt." When Aaron saw this, he built an altar in front of the calf and announced, "Tomorrow there will be a festival to the Lord."

"Then the Lord said to Moses, Go down, because your people, whom you brought up out of Egypt, have become corrupt. They have been quick to turn away from what I commanded them and have made themselves an idol cast

in the shape of a calf." —Exodus 32

Moses immediately ordered the slaughter of all who had worshipped the golden calf.

The Age of the Ram

The age of the Bull was over. The hands of the precessional clock had shifted to a new constellation and a new world age. A new age required a new god. The God of Moses, the God of Abraham, Isaac and Jacob, was the new god heralded by the new age of the ram—Aries, the god of war, also known as the "Lord of Hosts" (armies) and the "Lord of Heaven."

The age of the ram began 4000 years ago—when Abram/Abraham was called by "God" and left for Egypt— and ended 2000 years ago, which is why ancient religions at that time were ramoriented and/or used rams in their symbolism. Indeed, rams appear repeatedly in the old testament and were important symbols in Egypt during this period.

Abram (Ab-ram) left Sumer during the opening days of the new age of the ram, and it is Abram (who became Abraham) who was the patriarch and thus the founder of a new religion, the Jewish religion—but first he had to prove himself to the new god—the god of the ram—by sacrificing his first born son, Isaac (Genesis 22):

"And it came to pass after these things, that God did tempt Abraham, and said unto him, Abraham: and he said, Behold, here I am. And he said, Take now thy son, thine only son Isaac, whom thou lovest, and get thee into the land of Moriah; and offer him there for a burnt offering upon one of the mountains which I will tell thee of.... and Abraham built an altar there, and laid the wood in order, and bound Isaac his son, and laid him on the altar upon the wood. And Abraham stretched forth his hand, and took the knife to slay his son. And the angel of the LORD called unto him out of heaven, and said, Abraham, Abraham: and he said, Here am I. And he said, Lay not thine hand upon the lad, neither do thou any thing unto him: for now I know that thou fearest God, seeing thou hast not withheld thy son, thine only son from me. And Abraham lifted up his eyes, and looked, and behold behind him a ram caught in a thicket by his horns: and Abraham went and took the ram, and offered him up for a burnt offering in the stead of his son." Instead, Abraham sacrificed a ram.

By sacrificing a ram, provided by "God," and because he was willing to

kill his first born son, Abraham proved himself worthy of being the father of a new age religion... “And Abraham called the name of that place Jehovah...” —Genesis 22

FIGURE: The sacrifice of Isaac by Abraham.

PRECESSION: DEATH OF RAM-GOD. BIRTH OF PISCES-GOD: CHRIST

For the last 2,160 years, the sun has risen in the constellation of Pisces on the first day of Spring, the vernal equinox, and in the constellation of Virgo on the first day of Fall. Thus we see that the birth of Jesus is associated with Pisces, the two fish, and the virgin, Virgo

However, due to centrifugal forces which influences and slows the earths orbit around the sun, on the days of the equinox and solstice the rising sun seems to slowly change position relative to the constellations, like the backward ticking of a clock.

Because the Earth slows by 1 degree every 72 years, over a period of 2,160 years, it moves backward by 30 degrees, and therefore the sun begins to rise in a different constellation on the morning of the equinox and solstice. This is known as the precession of the equinoxes.

On December of 2012 and June of 2013, the cosmic clock ceased to rise in Pieces and Virgo on the Spring and Fall Equinox. The New Age had begun, and with the onset of each new age there is the ending of the precededing age. And as each age is associated with a god, the new age is linked with the birth of a new god and the death of the old god. However, the followers of the old god, and the religions developed to serve the old god, are loath to accept the transition. Rather than with rejoicing, the onset of a new age and a new god are met with fear and trembling. The birth of a new god spells calamity and destruction for those who prayed allegiance to what they had believed is the "one true god." Thus we see that the ancient Jews struggled against Moses and the new age god of the Ram, preferring to worship instead the old god, Taurus.

"Then the Lord said to Moses, Go down, because your people, whom you brought up out of Egypt, have become corrupt. They have been quick to turn away from what I commanded them and have made themselves an idol cast in the shape of a calf." —Exodus 32

Around 60 BC. as it was recognized that the old age of the Ram was coming to an end, the astronomers, priests, kings, astrologers turned to the

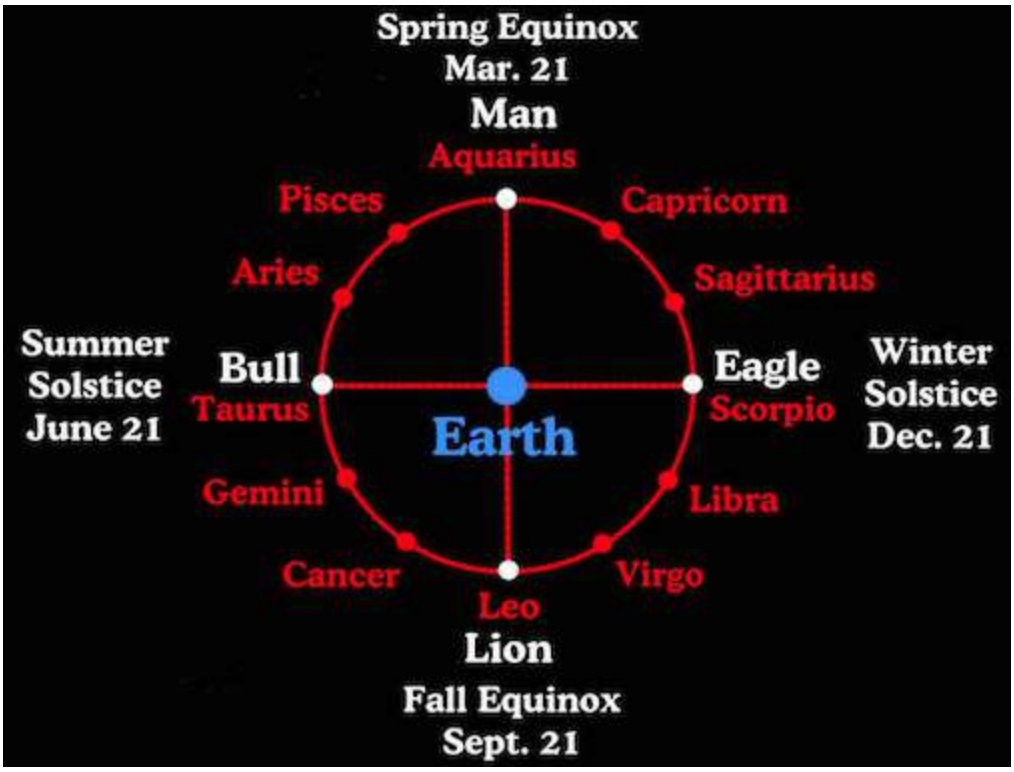
heavens searching for signs. In the Middle East, there was a fever of increasing excitement, a new god was to be born; what some believed would be a messiah. However, the priests of the old god struggled to destroy the new religion; but even so, a new religion was born of the virgin (Virgo): Christ, the god of the Pisces.

The founders of the new religion based on the age of Christ/Pisces/Virgo recognized that "his" time would also come to an end; and they incorporated this knowledge into their religion, warning all of great destruction heralded by an anti-christ: a beast, a lion (Leo) who would threaten the Virgin, a man who would flood the Earth (Aquarius, the water bearer), an Eagle (Scorpio) and and "ox" (Taurus). In fact, as of 2012, Aquarius and Leo govern the equinox, and Scorpio and Taurus rule the solstice.

Each new age heralds not just the birth of a new god, but periods of destruction and cosmic calamity followed by a new golden age.

The ancient astronomer priests believed that destiny, on a cosmic or global level, and the destruction and renewal of civilization, could be determined through the observation of the stars and via mathematical predictions based on precess, precession, and the orbit of the Earth as it made its journey through the heavens and the 12 houses of the zodiac; that is, the 12 constellations.

In the final passages of Revelation, we see not only references to precession and the 12 houses of the Zodiac, but we are told of a new golden age: "One of the seven angels... carried me away in the Spirit to a mountain great and high, and showed me the Holy City, Jerusalem, coming down out of heaven. It had twelve gates. The twelve gates were twelve pearls. I did not see a temple in the city, because... the city does not need the sun or the moon to shine on it, for the glory of God gives it light."



Periods of rebirth and destruction were believed to be linked to the Earth's movements from constellation to constellation, and this is also the overarching message of Revelation, i.e. Armageddon, in which Christians are warned of a war in heaven.

"And there appeared a great wonder in heaven: A woman clothed with the sun, and the moon under her feet, and upon her head a crown of twelve stars: And she being with child cried travailing in birth and pained to be delivered...

"And there appeared another wonder in heaven: And behold a great red dragon having seven heads and ten horns and seven crowns upon his head. And his tail drew the third part of the stars of heaven and did cast them to the Earth... -Revelation, 12

Thus we are told of "twelve stars" which are the 12 houses of the zodiac. And we are provided with the numbers: seven heads and ten horns and seven crowns. Seven + seven + ten = 24.

There are 24 hours in a day, a recurring cycle of 12 hours of light, 12 hours of darkness.

The number 24 is repeated again and again in Revelation, and the references is to repeating cycles: "...because he once was, now is not, and yet will come..."

And, as to "the third part of the stars," that Revelation tells us will be cast to Earth, this yields the number 8. What is the significance of number 8?

"Eight" refers to the eighth planet counting from the outer orbit of the solar system, i.e. the planet Venus, the morning star, also known as the great serpent, and by the name: "Lucifer."

"How art thou fallen from heaven, O' Lucifer star of the morning... the one that made the Earth to tremble, that did to shake kingdoms. That made the world as a wilderness, and destroyed the cities..." -Isaiah, 14

However, the same "warnings" and the complex science which predicts the coming and going of each Age, can be found in the ancient writings of many ancient peoples; beliefs based on observation, history, and mathematical analysis of the movement of the stars in relation to Earth.

There are hints in ancient records, for example, that cyclic periods of destruction were due to the Earth passing through regions of space that were in turmoil. We are told of wars in heaven, battles among the stars, in which the Earth was buffeted by debris from space and rocked by wayward planets, moons, comets and stars that snaked through the heavens like a giant serpent, or a like a dragon which swallowed (eclipsed) the sun and the moon, and then attacked the Earth. And we are warned that these cosmic catastrophic events are cyclic and will occur again in the future:

"Is this the one that made the Earth to tremble, that did to shake kingdoms. That made the world as a wilderness, and destroyed the cities...

"But beware and rejoice not because the rod of his that smote thee is broken: for out of the serpent's root and of his fruit shall be a fiery flying dragon... -Isaiah, 14

And, we are warned that these future cosmic catastrophic events, these wars in heaven, are directly related to precession and the passage of the Earth through the twelve houses of the Zodiac. The catastrophe is the death of the old god and the old age, and the birth of a new god and a new god. Out of destruction comes rebirth, e.g. god and the son of god, the sun god and the sun of god.

According to ancient Sumerian and Babylonian tradition: "Seven" refers

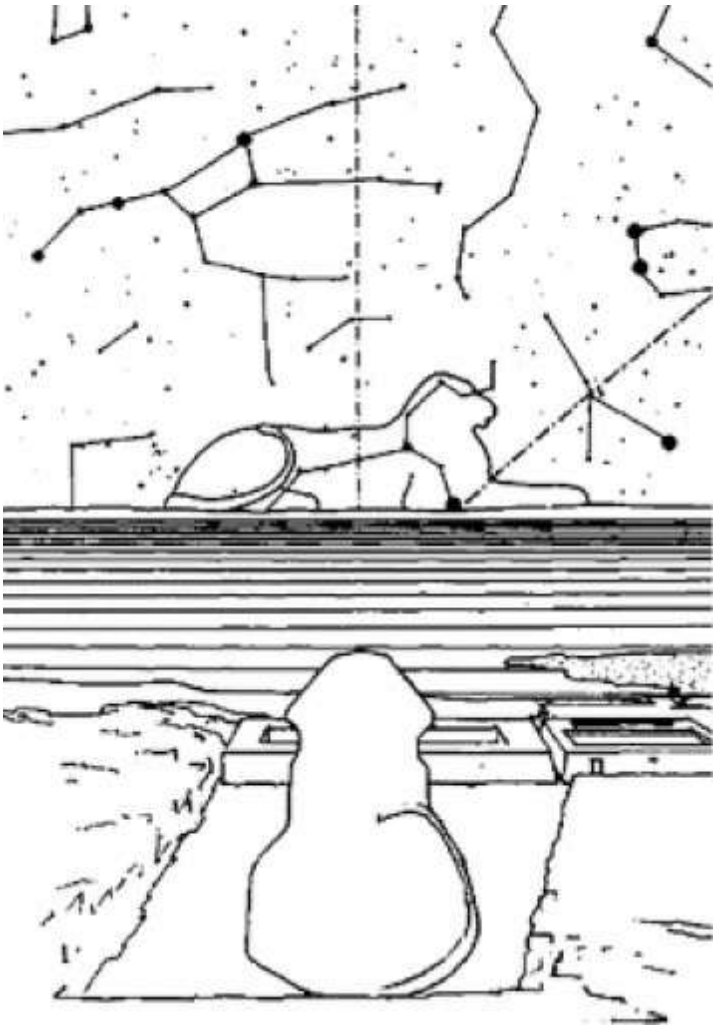
to our planet, mother Earth—the seventh planet when counting from the outer rim of the solar system. In the passage above, mother Earth becomes: "A woman clothed with the sun, and the moon under her feet" (though, as detailed later, this passage may also refer to the constellation of Virgo—a Virgin about to give birth to a new god).

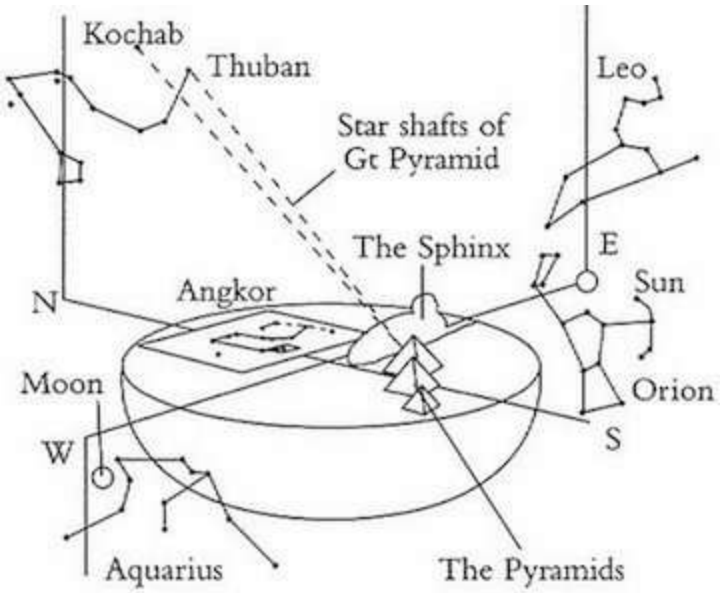
"Seven also refers to the seven stars of Ursa, the dominant stars of the north and which are believed to be linked to the operative powers controlling the universe. And, in Revelation, we are told of the "7 angels... 7 seals... 7 spirits... 7 stars..."

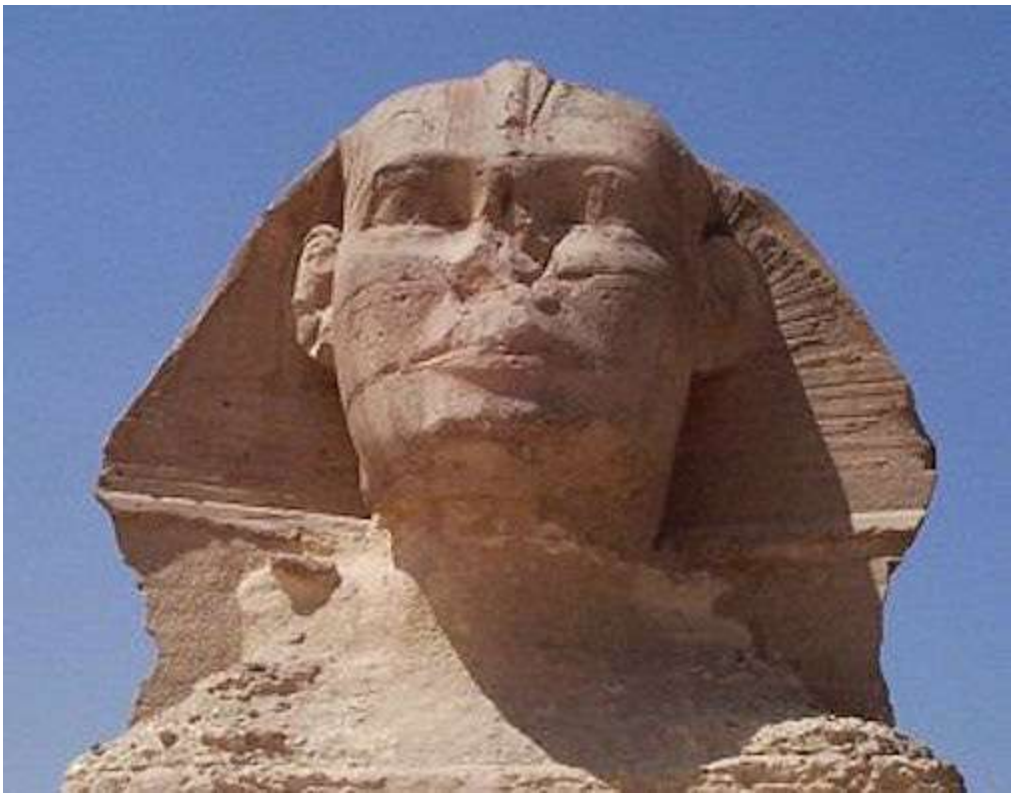
Because the ancients believed that the stars, and the movement of the Earth in its journey through the heavens was of fateful significance, the observations of the heavens and the cyclic nature of the dance of the stars, played a major role in decision making and in religious practices, including, as noted, in the orientation of ancient temples and predictions of destruction and rebirth.

THE AGE OF LEO 13,000 YEARS AGO

The scribes of ancient Egypt tell us that the first kings of Egypt established their rule 15,400 years ago, as also documented by the ancient lists of Egyptian kings. According to legend, as the Egyptian civilization prospered and grew, and with the coming of the New Age of Leo, 13,000 years ago, the ancient Egyptians erected a great Sphinx, with the head and body of a lion which faced the rising sun in the constellation of Leo on the first day of the spring equinox.




Kochab
Thuban
Leo
Star shafts of
Gt Pyramid
The Sphinx
E
Sun
N
Angkor
Moon
Orion
W
S
Aquarius
The Pyramids



The sphinx, which still has the body of a lion, the king of beast, is believed to originally have had head of a lion, just as the ancient Egyptian statues of the Bull, the Lion, and the Ram have the heads of a bull, a lion and and a Ram. However, it is believed that the original Lion head became so badly eroded over eons of time that it was re-carved, growing smaller with each carving and due to erosion, and was finally reshaped into the head of a pharaoh.

Although the original nature of the head is debatable, that the sphinx has the body of a lion, and was erected to face the rising sun on the day of the vernal equinox is undeniable. Twelve thousand five hundred years ago and for the next 2000 years, the sun rose in the constellation of Leo, the lion, on the morning of the spring equinox. It is reasonable to assume the Sphinx was designed to greet the rising sun in the house of Leo, 12,500 years ago.

There is, however, considerable evidence that much of the erosion took place soon after the Sphinx was carved, when inundated by torrential rains and a great flood over 12,500 years ago, during the age of Leo.

As first discovered by Egyptologist R. A. Schwaller, the erosion on the Sphinx is quite different from the erosion observable on other structures in Egypt. On the back and upper portions of the Sphinx and its nearby walls, the rock is badly worn, edges are rounded, and deep up and down vertical fissures are prominent; conditions usually created, not by wind, but water, and torrential rains. By contrast the erosion seen on the Old Kingdom tombs is completely different in character and typical of wind and sand, not water or rain.

These observations were later verified by Egyptologist John Anthony West and geologist Robert Schoch who concluded that the vertical fissures were indicative of severe water erosion and were caused by a long period of torrential rainfall or severe flooding. The evidence indicates the water levels rose to the very head of the Sphinx with waves lapping at its shoulder and face. In fact, most of the erosion is not at the base or the walls of the Sphinx, but as the top of the back and neck--areas most accessible to direct rainfall. On the other hand, the body of the Sphinx was buried beneath the shifting sands for much of history whereas the head, back and shoulders were continually exposed, thereby making them subject to the greatest degree of erosion. However, again, much of the erosion appears to be due to water, not

wind or sand.

Thus, it appears that the great Sphinx may have been erected over 12,000 years ago, during the age of Leo, and suffered a great deal of erosion when exposed to torrential rains and a great flood. In fact, according to the scribes of Egypt and the Egyptian King's List, the Egyptian King Osiris ruled Egypt during this epoch. Thus, according to legend, the great king, Osiris, who is associated with the constellation of Orion, was the last king of Egypt at the time of a massive flooding and thus a great catastrophe, some 12,000 years ago.

It has also been claimed that the three titanic pyramids of Giza were constructed over 12,000 years ago. Although there are claims and counter claims regarding who built the three pyramids of Giza, even the ancient kings of Egypt refer to them as being quite ancient.

In fact, although the grandest and oldest of them all is attributed to Khufu, many scholar believed that these claims are based on an obvious forgery and even a misspelling of his name by an archeologist who was hot to make a "great discovery." There is in fact evidence that Khufu claims that the Great Pyramid and the Sphinx, had been constructed long before his own time. Moreover, Khufu's funeral boat was not found in the pyramid, but buried outside, which certainly suggest that the Great Pyramid was never intended to be Khufu's final resting place, but a pyramid belonging to another, more ancient king.

As discussed, the three great pyramids on the Giza plateau are oriented and mirror, in size and location, the constellation of Orion. The layout and orientation of the three great pyramids of Egypt are a mirror image of the three main belt stars of Orion, and they best match the positions of these three belt stars 12,000 yeas ago, during the age of Leo. Not just the earth, but our solar system, our galaxy, and the stars of the constellations are in motion and change position over time.

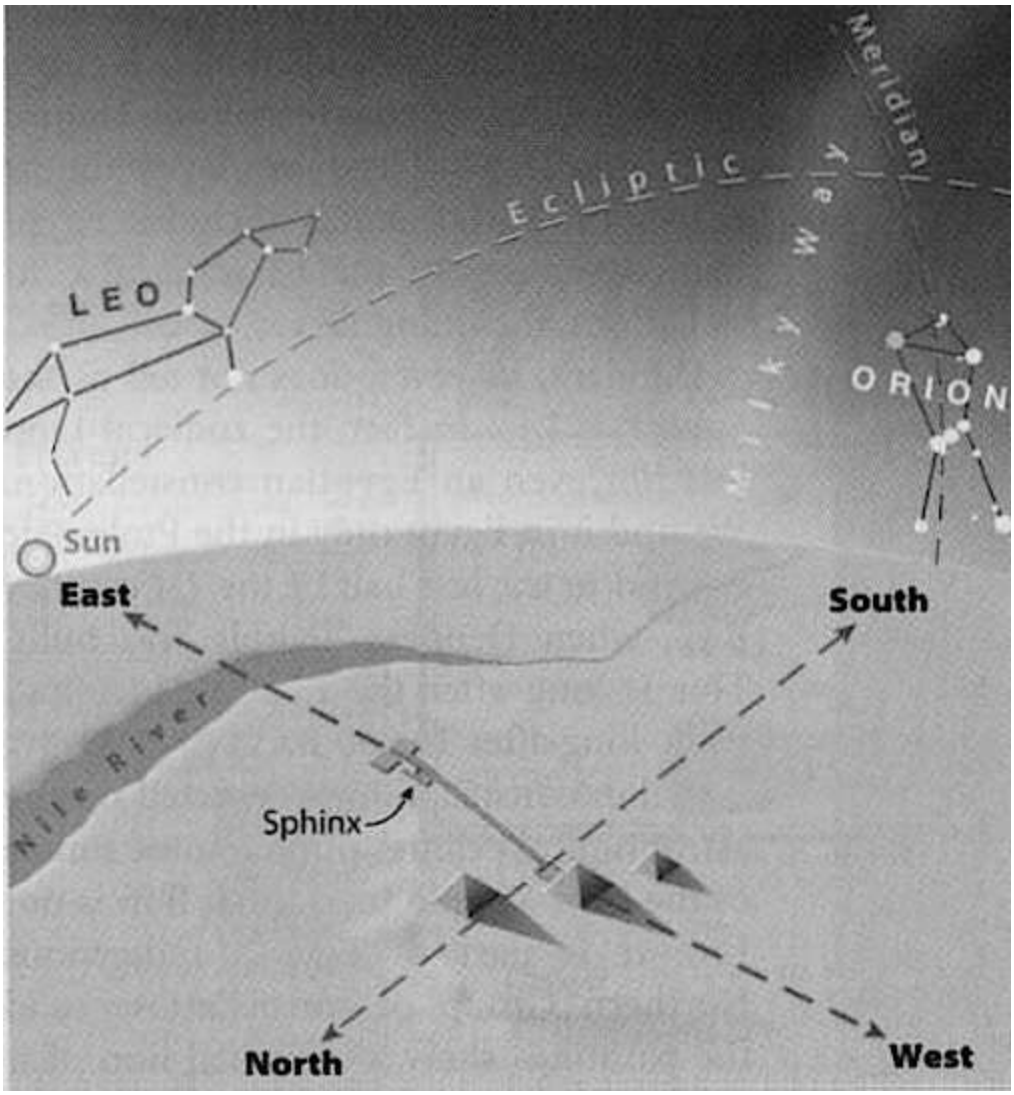
Most authorities agree that these first three great pyramids were constructed first, well before the erection of all other Egyptian pyramids. However, what has puzzled the experts is the fact that the first three pyramids are not only many times larger but have a degree of perfection not seen in all subsequent pyramids, over 100 which are known to have been constructed during and following the the reins of the 3rd dynasty some 4,500 years ago.

Indeed, the pyramids created by specific pharaohs during the 3rd dynasty,

are stunted, lopsided, poorly constructed miniaturizations in comparison to the thee great pyramids of Egypt. This is exactly opposite to what would be expected; i.e. improvement in design and increases in size should appear in later copies but this is not the case. All subsequent pyramids are stunted, tiny in size, and poorly constructed in comparison. Those responsible for building the three great pyramids had access to a technology and science not available to those who came after.

Coupled with their incredible size and utter perfection, and how they map the heavens and the Earth, as already noted, lends credence to the possibility that the three g pyramids of Giza were built by a different, technologically advanced civilization, 12,000 years ago, and the later, inferior pyramids were created 8,000 years later, some 4,000 years ago.

Some ancient Arabian historians explain that these first three Pyramids, which exceeds all other pyramids in size and perfection, were created in anticipation of the great flood and calamity which the ancient Egyptians realized might destroy much of their world. Basing their conclusion on ancient manuscripts, Arab historians, such as al-Murtadi, in 1584, claim that before the great flood, the king of Egypt decided to secure the treasures of all ancient wisdom. This king built the pyramids to preserve the records of the sciences and wisdom of the ages, which were engraved in tablets, and memorials and then stored within the great pyramids and made secure.



“Saurid...one of the kings of Egypt prior to the Great Flood... was the builder of two of the great pyramids....Saurid had a dream where the Earth turned upside down with all its people, the people fled in a blind rush, and the stars fell down...” -al-Maqrizi.

According to legend, all the kings advisors had the same dream and predicted the end of civilization. So, Saurid, the pre-deluvial King of Egypt, decided to build the pyramids to serve as great museums and libraries where all the worlds knowledge could be preserved. Indeed, the great pyramid itself, was to be a source of knowledge and wisdom, harboring the answers to all questions regarding the cosmos and the creation.

In fact, the great pyramid contains a number of chambers, one on top of the other, similar to many universities libraries. However, there is basically no evidence to suggest it was ever meant to serve as a tomb for an Egyptian king on his journey to the afterlife. As all who visit or who have studied these grand monuments can attest, the three pyramids are not just the oldest, grandest, largest, and architecturally superior to all those that came after, but they are completely un-Egyptian. Unlike all other Egyptian edifices, the chambers and inner walls of the three great pyramids of Giza are completely barren of hieroglyphics and are lacking in any markings whatsoever.

Typically, all Egyptian works, from 6,000 years ago to the end of their

civilization, are covered with symbols, artistic renderings, hieroglyphics. Not so the great pyramid. The interiors are completely barren and lack ornamentation. Moreover, there is no evidence of torch light within the inner chambers. No smoke, no soot, no ash, nothing to indicate how the interiors were lighted; nothing except drawings of what appear to be giant electric lights, and the discovery of an ancient electric battery.

According to Plato: "We know nothing of what happened in ancient times... because of these great destructions and pestilence from heaven that comes pouring down, and which leaves few survivors, and because, after many generations, the survivors of that destruction die, leaving no written word.. Now these memories as myths."

Be it memory or myth, ancient peoples from throughout the world speak of a horrific cosmic cataclysm which destroyed the cities and civilizations of woman and man. And most blame the end of this golden age on a cosmic serpent--a serpent which may represent the Milky Way galaxy or the 12 major constellations which form circles within circles: and all circles repeat themselves in great cycles.

Twelve thousand years ago, on the morning of the Spring and Autumn equinox, the sun rose in the house of Leo and Aquarius. The cosmic clock has come half-circle and we have entered the new age of Aquarius--and with each new age, there is an ending of an old.

PRECESSION: THE COSMOLOGY AND GODS OF NUMBERS

"Newton was not the first of the Age of Reason. He was the last of the magicians, the last of the Babylonians and Sumerians.... He looked on the whole universe and all that is in it as a riddle, as a secret which could be read by... certain mystic clues...laid about by... an esoteric brotherhood. He believed that these clues were to be found...in certain papers and traditions handed down by the brethren in an unbroken chain back to the original cryptic revelation in Babylon. He regarded the universe as a cryptogram set by the Almighty." —John Maynard Keynes.

Throughout much of history, there have been secret societies consisting of men who believed that the discoveries of science should be kept secret from kings, ministers, government officials, and those who would exploit science for the purpose of evil and doing harm.

Asoka, the grandson of Chandragupta who had unified ancient India, was

a warrior and a scientist, and he applied his understanding of science, to war. He was overcome by his own successes and developed a horror for war. Upon becoming emperor of India, Asoka forbid men to ever use their intelligence or their knowledge of science, for purposes of evil. Scientists and scholars of ancient

India, were forced to take vows of secrecy and to become members of a secret society who could only communicate openly through riddles, parables, and secret codes.

The ancient astronomer priesthood in many ways, also functioned like a secret society, with secret initiation rites, and hidden knowledge that only initiates were privy too.

For example, the Kaballa tells us that there are 72 angels and that those who know their names and numbers can use them to invoke or approach the divine powers—the Sephiroth.

In the ancient religion of China, the initiation ritual of the Hung League involved questions that involved the numbers 36, 72, and 108 (Ward, 1925) —all of which are multiples of 12:

"I saw two pots with red bamboo. In one pot were 36 and in the other 72 plants, together, 108. Who in the world knows the meaning of this?"

Indeed, what is the meaning of this?

All three are multiples of 12. Moreover, these numbers, as well as the numbers 9, 12, 30, 36, 108, 360, 2160, 25,920, 432,000, 1,296,000, repeatedly appear in ancient religious texts and in religious "myths" the world over.

In Arabic-pre-Islamic tradition, it was said that martyrs were rewarded in heaven with 72 Virgins.

"Man has not touched them before them nor jinni. Which then of the bounties of your Lord will you deny? Reclining on green cushions and beautiful carpets. Which then of the bounties of your Lord will you deny? — The Beneficent.

Hadith number 2,562 in the collection known as the Sunan al-Tirmidhi says, "The least [reward] for the people of Heaven is 80,000 servants and 72 wives, over which stands a dome of pearls, aquamarine and ruby."

The ancient Egyptian religious myth of Osirus tells us that 72 divine conspirators, led by Seth, plotted to kill Osirus (Budge, 1903, Sellers, 1992).

The mystics of the Kaballah believe that 72 is Yahweh's secret number.

Yahweh instructed Moses and Aron to take 70 of the elders of Israel to accompany them to the Holy Mount; i.e. Moses + Aron + 70 = 72. However, Moses and Aron also brought along 2 of Arons 4 sons. Thus Aron and Moses were accompanied by 72 men.

These numbers are significant because they are precessional numbers which yield 2160—the total number of years in which the sun was believed to spend in each of the 12 constellation.

For example, 30 times 72 equals 2160—the number of years the ancients believed it took the sun to pass from one to the next house of the zodiac.

Consider: 12 is the number of houses of the zodiac. There are 360 degrees to a circle and 30 is the number of degrees assigned to each house (360 divided by 12=30). 72 is the number of years for the sun to complete a precessional shift of one degree (the modern estimate being 71.6). And, 360 is the total number of degrees in the Earth's ecliptic.

Again, 72 x 30 yields 2160 which is the total number of years in which the sun spends in each house. 360 x 72 equals 25,920, as does 2160 x 12, which is a very close estimate of the number of years to complete a precessional cycle through all 12 houses of the zodiac, the modern estimate being 25,777 years.

Likewise, the value of 2160 is remarkably close to the modern estimate of 2148, which is the time it now takes for a precessional shift through a single constellation.

In some religious "myths," the number 36 is added to 72, to obtain 108:

"In one pot were 36 and in the other 72 plants, together, 108. Who in the world knows the meaning of this?"

The number, 108, can be multiplied by factors of 10 to obtain the number of years for a precessional shift through a single constellation, i.e. 20 times 108 equals 2,160.

The temple complex of Angkor, India, has five gates which lead to five roads, each of which is bordered by 108 gigantic stone figures, i.e. 540 stone figures total. These stone figures are bound to a huge Naga serpent, which they pull in order to churn the Milky Oceans of the Universe.

540, like 108, is a precessional number.

For example, 540 x 4 = 2,160.

The number "4" is derived from the four seasons (the two solstices and two equinoxes) and which also provides us with the sign of the cross.

Also, 540 x 48 = 25,920

In ancient Indian religion, the number 48 appears as a component of each divine year. For example, 4,800 is the duration of Krita Yuga.

The Rigveda also tell us of the "12-spoked wheel in which the 720 sons of Agni are established."

12 x 720 = 8640 which when multiplied by 30 = 25,920.

The number 12, of course, refers to the 12 houses of the zodiac. And, 12 has always been a very important number in ancient, as well as more modern religions, such as Judaism and Christianity.

The ancient Greeks and Romans believed in 12 great gods, the 12 Olympians of the Greek Pantheon. However, before the rise of the 12 Olympians, the Greeks tell us there were 12 Titans.

There are 12 months in a year, 12 hours in a day, and 12 hours in a night, and 12 constellations.

Osiris (The Lord of the Dead), was killed by Set in the company of 72 conspirators, and passes judgment on the dead with the assistance of a council of 12.

"The Holy City, Jerusalem, coming down out of heaven.... had a great, high wall with twelve gates, and with twelve angels at the gates. On the gates were written the names of the twelve tribes of Israel. There were three gates on the east, three on the north, three on the south and three on the west.

The wall of the city had twelve foundations, and on them were the names of the twelve apostles of the Lamb" —Revelations.

Jesus had his 12 apostles. Moses "erected 12 stone pillars" (Exodus 24:4). And Jacob and Ishmael each had 12 sons.

"As for Ishmael... of him twelve chieftains will be born, his shall be a great nation" —Genesis 17:20.

"Those were the sons of Ishmael...twelve chieftains each to his own nation" —Genesis 25.

"And the number of sons of Jacob was twelve." —Genesis 35

However, although Jacob had 12 sons, before the birth of his last (12th son) Benjamin, the number of his brood had also numbered 12 if we include his daughter Dinah. Likewise, the 12 constellations of the zodiac consists of 11 males and 1 female—Virgo.

The tribe of Benjamin, that is, the Benjaminites, also took on a female role. As detailed in the Jewish Bible (Tanakh), the Benjaminites were a tribe

of notorious homosexuals.

As detailed in Genesis, Jacob's other sons were also linked to the zodiac: Juda was referred to as a lion (Leo), Zebulun was linked to Aquarius—he was to be a Dweller of the Seas—and Joseph was linked to Sagittarius as he was depicted as a bowman.

Also, Levi and Simeon were linked together, thus forming a Gemini (twins). Both brothers, Jacob prophesied, would forfeit their domains and their offspring would be dispersed among the other 10 tribes. However, the list stayed at 12 with the addition of Joseph's two sons, Ephraim and Manasseh.

Also, in the Jewish "Bible" —i.e, in the Nevi'm (The Prophets)— there are 12 minor prophets and 9 major prophets listed. Again, these are precessional numbers.

The ancients also counted 9 planets, the Earth being number 7, and Venus, number 8.

And, 12 x 9 = 108. These are all precessional number, and 9 and 12 are repeatedly mentioned in the Bible and were considered sacred numbers by a number of ancient religions:

The Aztecs and Mayas believed in a pantheon of 9 deities, as did the priests of Egypt during the earliest dynastic period, 4,500 years ago (Budge, 1903, Thomkins, 1987). The Mayas also believed that the underworld has nine levels through which the dead must journey over a period of 4 years (Coe, 1993).

We also know that the Hebrew word "Mazal-tov" (shouted during births and weddings) does not mean "good luck" per se, but a "good zodiac," or, a "good constellation/station." That is, a wish that the sun's station, in a specific constellation on the day of the birth/wedding, will bring good luck.

Again, there are 12 constellations and 12 is a precessional number.

Or consider the number, 432,000.

The Mayan calendar featured the number 432,000, as well as 2160 and others that allowed for the calculation of precession, i.e. 1 Tun = 360 days, 2 Tuns = 720 days, 6 Tuns 2160 days, 6 Katuns = 43,200 days (Wright, R. 1991).

The ancients believed that precession through one constellation takes 2,160 years. Precession through two houses of the zodiac (60 degree across the ecliptic) was believed to take 4,320 years.

In ancient Indian religion, Kali Yuga is believed to be one of the four ages of Earth . Kali Yuga is identified as the current and last age and consists of 1200 Divine years. This is equal to 432,000 years of mortal man.

There are also 10,800 stanzas in the religious text, the Rigveda, the most ancient of Vedic literature— 10800 being a multiple of 108. Each stanza consists of 432,000 syllables.

In the Sumerian King's list, it is asserted that the Anunnaki gods arrived on Earth, 432,000 years ago.

We are also told by Berossus of ancient Babylon, that gods and demi-gods ruled ancient Summer for a total of 432,000 years.

According to ancient Chinese traditions, all the world's knowledge, before the destruction of the last world by the worldwide deluge, were said to be written down in 4,320 volumes.

Berossus also tells us that there are 2,160,000 years between creation and universal catastrophe, which is the amount derived at when 432,000 is multiplied by 5.

The four seasons, plus the axis running through the Earth (passing through north and south pole) yields the number "5."

Likewise, 2,160,000 represents 1000 cycles of the number of years it takes the sun to pass from one to the next house of the zodiac.

As noted, by multiplying the base and height of the Great pyramid by 43,200 one can arrive at an astonishingly close approximation of the dimensions of the Earth.

Or, consider the Norse poem which describes the battle of the gods and the end of the world: "500 doors and 40 there are I seen, in Valhalla's walls; 800 fighters through each door fare, When to war with the Wolf they go."

500 plus 40 = 540. 540 x 800 = 432,000.

432,000 divided by 6,000=72

432,000 divided by 2,000=2,160

Again: "Coincidence" is not a scientific explanation.

Dr. Herman Hiprect, who participated in "The Babylonian Expedition of the University of Pennsylvania" has reported that in analyzing the numerous Mesopotamian mathematical tablets, that "all the multiplication and division tables from the temple libraries of Nippur and Sippar, and from the library of Ashurbanipal in Ninevah, are based upon the number 1296000." He concluded that this number had to be related to precession.

12,960,000 divided by 500=25,920

500 x 25,920=12,960,000

As summed up by de Santillan and von Dechend (1969), “When one finds the same numbers reappearing under several multiples in the Vedas, in the temples of Angkor, in Babylon, in Heraclitius’ dark utterances, and also in the Norse Valhalla, it is not an accident... These refer to celestial events... and constitute... a language of awe inspiring antiquity... that concentrates on numbers, motions, measures, overall frames, schemas, and on the structure of numbers, on geometry.... which transmit... a precessional message...”

Yes, but is the message

The ancients believed that precession, the cosmic clock,was directly linked to cycles of creation and destruction, of death and rebirth. Precession was a key to predicting the future—a future based on the past, including past cycles of cosmic destruction: the old age replaced by the new.

“And the seven judges of hell raised their torches, lighting the land with their livid flame. A stupor of despair went up to heaven when the god of the storm turned daylight into darkness, when he smashed the land like a cup” - the Epic of Gilgamesh.

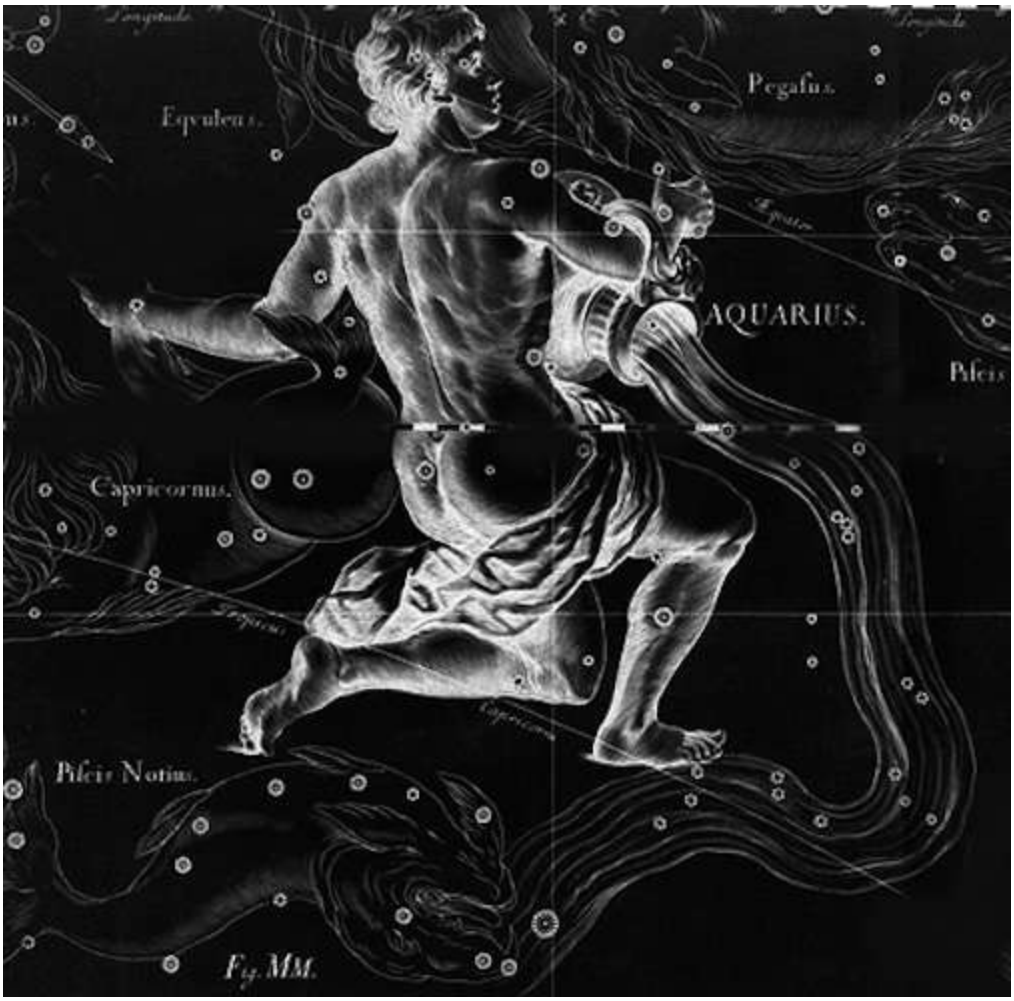
THE ANTI-CHRIST: **AQUARIUS, LEO, SCORPIO, TAURUS**

“And there appeared a great wonder in heaven: A woman clothed with the sun, and the moon under her feet, and upon her head a crown of twelve stars: And she being with child cried travailing in birth and pained to be delivered...

“And there appeared another wonder in heaven: And behold a great red dragon having seven heads and ten horns and seven crowns upon his head. And his tail drew the third part of the stars of heaven and did cast them to the Earth...

“And there was a war in heaven: Michael and his angels fought against the dragon: and the dragon fought and his angels. And the great dragon was cast out, that old serpent, called the Devil and Satan which deceivith the whole world: He was cast out and his angels were cast out with him...

“And the serpent cast out of his mouth water as a flood. And the Earth opened her mouth and swallowed up the flood which the dragon cast out his mouth. And the dragon was wroth and went to make war...” —Revelation, 12



The coming of Christ, a Messiah, the new god, and the onset of a "new Golden Age" was heralded by the sun's movement from Aries into the house of Pisces, 2000 years ago. In the mind of at least some of the ancients, the birth of the new god was also signaled by the conjunction of Jupiter and Saturn, which lined up together in the constellation of Pisces, in the year 6 B.C., thus forming a very bright "star"—the "star of Bethlehem."

These "blessed" events were immortalized two thousand years ago by Virgil, in his Fourth Ecologue: "Now the Virgin returns, the reign of Saturn returns, now a new generation descends from heaven on high. Only do thou, pure Lucina, smile on the birth of the child, under whom the iron brood shall first cease, and a golden race spring up throughout the world!"

And who was the "virgin?"

Virgo. With her return, Virgo the virgin would give birth to a new age and a new god.

Two thousand years ago, whereas Pisces governed the vernal equinox, the sun rose in Virgo during the autumn equinox. However, 12,000 to 14,000 years ago, Virgo governed the vernal equinoxes during the "golden age" and when she left, the "golden age ended" in a confluence of catastrophes.

Hence, Virgil's poem, refers to the return of the Virgin which coincided with the new age of Pisces both of which ruled during the last "Golden age."

Thus, the birth of Christ was associated not only with the new golden age of Pisces, but with a virgin—Virgo: The virgin birth of the new god. Virgo would rein for 2,160 years, and with her departure (in about 100 years), the god she gave birth to will die. However, a new god will not only take the place of the old god, but her departure will give birth to the new god as well —a god associated with the "beast" —Leo (the lion). The Virgin will flee only to be pursued by Leo who shall take her place.

Likewise, in Revelation, we are told that the ending of the next world will be associated with a "beast...like that of a lion..." and a "dragon" who "gave the beast his power and his throne and great authority..." and who "pursued the woman who...was pregnant and cried out in pain as she was about to give birth..." and who, upon giving "birth to the male child...fled into the desert.... where she might be taken care of for 1,260 days...the dragon...pursued the woman..."

The woman (Virgo) gives birth (a virgin birth) to a new God only to depart and to be pursued by the water belching dragon and anti-Christ who gives power to a lion-like beast (Leo) who will rule the heavens. However, by departing she also gives birth to a new god: the beast, Leo.

Revelations also gives us the number of the beast: "His number is 666. This calls for wisdom. If anyone has insight, let him calculate the number of the beast."

"666" is obviously a reference to a repeating cycle. Yet, the author of Revelations asks us to look beyond the obvious and to "calculate the number of the beast."

Calculating the Number of the Beast: 6 x 6 x 6 = 216. "216" is a precessional number: 2,160— the number of years to complete a precessional cycle.

"The dragon...which gave power to the beast... had...ten horns." - Revelation.

10 x 216 = 2160.

The “Beast” is Leo: “The horses... I saw in my vision looked like this: The heads of the horses resembled the heads of lions....Then I saw another mighty angel coming down from heaven...he gave a loud shout like the roar of a lion....And I saw a beast coming out of the sea.” (Aquarius—the sea.)

“He had...a mouth like that of a lion.” -Revelation.

And his repeating cyclic number, 666, refers to precession: “The beast, which you saw, once was, now is not, and will come up out of the Abyss...The inhabitants of the Earth.... will be astonished when they see the beast, because he once was, now is not, and yet will come...” -Revelation

As noted, precession is a counterclockwise, or rather, an anti-clockwise phenomenon. Due to the retardation of the Earth’s orbital movement of 1 degree every 72 years, every 2,160 years the sun rises in the previous house of the Zodiac.

Hence, instead of moving forward from Pisces to Aries, in about 100 years the sun will rise in Aquarius, thereby signaling the death of the god of Pisces (the fish) and heralding the new age god of Aquarius who will rule the vernal equinox.

Likewise, Virgo (the virgin) will be replaced by Leo (a predatory “Beast”) who will rule the autumn equinox, just as he did 12,000 years ago: “The horses... I saw in my vision looked like this:

The heads of the horses resembled the heads of lions....Then I saw another mighty angel coming down from heaven...he gave a loud shout like the roar of a lion....And I saw a beast coming out of the sea.” (Aquarius—the sea). “He had...a mouth like that of a lion....” -Revelation

The age of Aquarius/Leo, therefore, is the anti-Christ: Symbolized by the movement away from Pisces/Virgo, and the end of that “god’s” rule.

“And the serpent cast out of his mouth water as a flood...”

Some 12,000 years ago, Aquarius (the god of the waters) ruled the autumn equinox and Leo ruled the vernal equinox. It is during this ancient period that the “Golden Age” is believed to have ended, and civilization along with it in a terrible flood that coincided with a “war in heaven.” Thus, the return of Leo and Aquarius (albeit in the opposite equinox) and the departure of Pisces and Virgo, is also believed to herald not just a new beginning, but a terrible ending—a confluence of catastrophes that will coincide with a celestial war in heaven and a battle among the stars that will begin with the rise of Leo, the “Beast:”

“Look, he is coming with the clouds, and every eye will see him... and there before me was a throne... In the center, around the throne, were four living creatures. The first living creature was like a lion” (Leo?) “the second was like an ox” (Taurus?) “the third had a face like a man (Sagittarius/Aquarius), “the fourth was like a flying eagle...”

And what is the “flying eagle?” Scorpio.

Again, as of 2012, the sun rises in the houses of Scorpio and Taurus on the solstice, and in the constellations of Leo and Aquarius on equinox.

Revelation continues: “the fourth was like a flying eagle... And I saw a mighty angel proclaiming in a loud voice, “Who is worthy to break the seals and open the scroll...Then one of the elders said to me... the Lion... has triumphed. He is able to open the scroll and its seven seals... and the stars in the sky fell to Earth. The sky receded like a scroll, rolling up, and every mountain and island was removed from its place. Then the kings of the Earth, the princes, the generals, the rich, the mighty, and every slave and every free man hid in caves and among the rocks of the mountains... Then the seven angels who had the seven trumpets prepared to sound them. The first angel sounded his trumpet, and there came hail and fire mixed with blood, and it was hurled down upon the Earth. A third of the Earth was burned up, a third of the trees were burned up, and all the green grass was burned up.

The second angel sounded his trumpet, and something like a huge mountain, all ablaze, was thrown into the sea....The third angel sounded his trumpet, and a great star, blazing like a torch, fell from the sky...” - Revelation.

THE COSMIC CLOCK

“Who among us can tell the future by letting us hear the First Things?” — Isaiah, 43.

Revelation repeatedly refers to a cosmic catastrophe associated with the house of Leo (the lion) and Aquarius (waters/sea). Ezekiel (38, 39) tells us that in the “End of Days” fire and brimstone will fall from the skies, and there will be great earthquakes, plagues, and wars.

Ezekiel, like Revelation and Isaiah, also contains precessional language, as does the Mayan/Olmec calendar. And, they base their predictions of the future, on what has happened in the past...that the End is anchored in the Beginning (e.g. Isaiah, 48; Zechariah, 1, 7).

The best predictor of the future, is the past.

However, neither Revelation, Ezekiel, or Isaiah, provide us with a date in which these terrible cosmic events are to recur, other than to warn that these disasters will begin with the return of the great serpent, the anti-Christ, and the beast: Aquarius/Leo.

The Mayas, basing their calculations on the Venus calender, were more exacting.

According to the Mayan/Olmec/Aztec Calendar, the date for the beginning of the end of the previous age and its gods, and the onset of a new age and its gods, will be "4 Ahau 3 Kankin" (December 23, 2012), "and it will be ruled by the Sun God, the ninth Lord of the Night."

Welcome to the Age of Aquarius.

References

Budge, W. (1994). The Book of the Dead. New Jersey, Carol.

Campbell, J. (1988) Historical Atlas of World Mythology. New York, Harper & Row.

Dennell, R. (1985). European prehistory. London, Academic Press.

Frazier, J. G. (1950). The golden bough. Macmillan, New York.

Gowlett, J. (1984). Ascent to civlization. New York: Knopf.

Griffiths, J. G. (1980). The Origins of Osiris and His Cult. Brill.

Harris, M. (1993) Why we became religious and the evolution of the spirit world. In Lehmann, A. C. & Myers, J. E. (Eds) Magic, Witchcraft, and Religion. Mountain View: Mayfield.

Joseph, R. (2002). NeuroTheology: Brain, Science, Spirituality, Religious Experience. University Press.

Joseph, R. (2011a). Dreams and Hallucinations: Lifting the Veil to Multiple Perceptual Realities, Cosmology, 14

Jung, C. G. (1964). Man and his symbols. New York: Dell.

Malinowski, B. (1954) Magic, Science and Religion. New York. Doubleday.

Redford, D. B. (2003). The Oxford Guide: Essential Guide to Egyptian Mythology, Berkley.

Roginskii Y. Y., & Lewin S. S. (1955). Fundamentals of Anthropology. Moscow: Moscow University Press.

Smith, G. A. (1872/2005). Chaldean Account of Genesis (Whittingham &

Wilkins, London, 1872). Adamant Media Corporation (2005).
Wilson, J. A. (1951) The culture of ancient Egypt. Chicago, U. Chicago Press.
Wolpoff, M. H. (1980), Paleo-Anthropology. New York, Knopf.

3. Evolution of Spiritual Consciousness and Paleolithic Cosmology

R. Joseph, Ph.D.
Cosmology.com

Abstract
The emergence of cosmological consciousness and its symbolism, is directly linked to the evolution of the Cro-Magnon peoples who may have developed the first cosmologies, 20,000 to 30,000 years ago. However, the development of Paleolithic cosmology was in turn driectly related to complex mortuary rituals and belief in the transmigration of the soul, of a world beyond the grave, has been a human characteristic for at least 100,000 years. The emergence of spiritual consciousness and its symbolism, is directly linked to the evolution of the temporal and frontal lobes and to the Neanderthal and Cro-Magnon peoples, and then the first cosmologies, 20,000 to 30,000 years ago. These ancient peoples of the Upper and Middle Paleolithic were capable of experiencing love, fear, and mystical awe, and they carefully buried those they loved and lost. They believed in spirits and ghosts which dwelled in a heavenly land of dreams, and interned their dead in sleeping positions and with tools, ornaments and flowers. By 30,000 years ago, and with the expansion of the frontal lobes, they created symbolic rituals to help them understand and gain control over the spiritual realms, and created signs and symbols which could generate feelings of awe regardless of time or culture. Because they believed souls ascended to the heavens, the people of the Paleolithic searched the heavens for signs, and between 30,000 to 20,000 years ago, they observed and symbolically depicted the association between woman's menstrual cycle and the moon, patterns formed by stars, and the

relationship between Earth, the sun, and the four seasons. These include depictions of 1) the “cross” which is an ancient symbol of the fours seasons and the Winter/Summer solstice and Spring/Fall equinox; 2) the constellations of Virgo, Taurus, Orion/Osiris, the Pleiades, and the star Sirius; 3) and the 13 new moons in a solar year. Although it is impossible to date these discoveries with precision, it can be concluded that spiritual consciousness first began to evolve over 100,000 years ago, and this gave birth to the first heavenly cosmologies over 20,000 years ago.

KEY WORDS: Consciousness, dreams, spirits, souls, evolution, amygdala, hippocampus, limbic system, temporal lobe, frontal lobes, Cro-Magnon, Neanderthals, constellations, Virgo, Taurus, Orion, Osiris.

1. THE TRANSMIGRATION OF THE SOUL

Belief in the transmigration of the soul, of a life after death, of a world beyond the grave, has been a human characteristic for at least 100,000 years, as ancient graves and mortuary rites attest (e.g., Belfer-Cohen & Hovers, 1992; Butzer, 1982; McCown, 1937; Rightmire, 1984; Schwarcz et al., 1988; Smirnov, 1989; Trinkaus 1986). Even ancient “archaic” humans, despite their small brains and primitive intellectual, linguistic, cognitive, and mental capabilities, and who wondered the planet over 120,000 years ago, carefully buried their dead (Butzer, 1982; Joseph 2000a; Rightmire, 1984). And like modern Homo sapiens, they prepared the recently departed for the journey to the Great Beyond: across the sea of dreams, to the land of the dead, the heavens, the realm of the ancestors and the gods.

Throughout the Middle and Upper Paleolithic it was not uncommon for tools and hunting implements to be placed beside the body, even 100,000 years ago, for the dead would need them in the next world (Belfer-Cohen & Hovers, 1992; McCown, 1937; Trinkaus, 1986). A hunter in life he was to be a hunter in death, for the ethereal world of the Paleolithic was populated by spirits and souls of bear, wolf, deer, bison, and mammoth (e.g., Campbell, 1988; Joseph 2001, 2002; Kuhn, 1955). Moreover, food and water might be set near the head in case the spirit hungered or experienced thirst on its long sojourn to the heavenly Hereafter. And finally, fragrant blossoming flowers

and red ocher might be sprinkled upon the bodies (Solecki, 1971) along with the tears of those who loved them.

Given the relative paucity of cognitive, cultural, and intellectual development among Middle Paleolithic Neanderthal and "archaic" humans, and the likelihood that they had not yet acquired modern human speech (Joseph, 1996, 2000b), evidence of spiritual concerns among these peoples demonstrates the great antiquity of belief in an after-life and the soul. Humans began evolving a spiritual consciousness over 100,000 years ago. Seventy thousand years later, this consciousness would give birth to the first cosmologies.

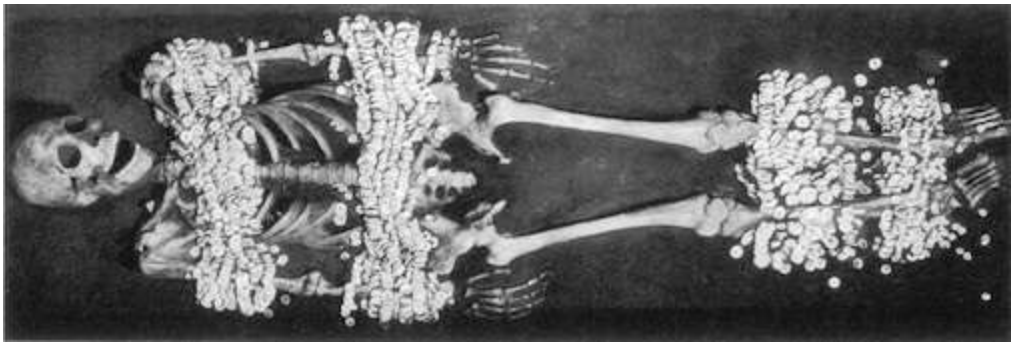


FIGURE: Cro-Magnon burial.

2. MIDDLE PALEOLITHIC SPIRITUALITY

When humans first became aware of a "god" or "gods" cannot be determined. Nevertheless, the antiquity of religious and spiritual belief extends backwards in time to over 100,000 years. It is well established that Neanderthals and other Homo Sapiens of the Middle Paleolithic (e.g. 150,000 to 35,000 B.P.) and Upper Paleolithic (35,000 B.P. to 10,000 B.P.) engaged in complex ritualistic behavior. These rituals are evident from the manner in which they decorated their caves and the symbolism associated with death (Akazawa & Muhesen 2002; Conrad & Richter 2011; Harvati & Harrison 2010; Kurten 1976; Mellars 1996).

Neanderthals (a people who lived in Europe, Russia, Iraq, Africa, and China from around 150,000 to 30,000 B.P.), have been buried in sleeping positions with the body flexed and lying on its side. Some were laid to rest with limestone blocks placed beneath the head like a pillow—as if they were not truly dead but merely asleep (Akazawa & Muhesen 2002; Harvati & Harrison 2010).

Sleep and dreams have long been associated with the spirit world, and it is through dreams that gods including the Lord God worshipped by Jews, Christians, and Muslims, are believed to have communicated their thoughts, warnings, intentions, and commands. Throughout the ages (Campbell 1988; Freud, 1900; Jung 1945, 1964), and as repeatedly stated in the Old Testament and the Koran, dreams have been commonly thought to be the primary medium in which gods and human interact (Joseph 2002). Insofar as the ancients (and many moderns folks) were concerned, dreams served as a doorway, a portal of entry to the spirit world through which "God," His angels, or myriad demons could make their intentions known.

FIGURE: Paleolithic burial in sleeping position.

It is through dreams that one is able to come into direct contact with the spirit world and a reality so magical and profoundly different yet as real as anything experienced during waking. It is through dreams that ancient humans came to believe the spiritual world sits at the boundaries of the physical, where day turns to dusk, the hinterland of the imagination where dreams flourish and grow. And it is while dreaming that one's own soul may transcend the body, to soar like an eagle, or to commune with the spirits of loved ones who reside in heaven along side the gods.

Neanderthals prepared their dead for this great and final journey, by laying their loved ones to rest so that they would sleep with the spirits and dream of

heavenly eternity.

Neanderthals have also been buried surrounded by goat horns placed in a circle, with reindeer vertebrae, animal skins, stone tools, red ocher, and in one grave, seven different types of flowers (Solecki 1971). In one cave (unearthed after 60,000 years had passed), a deep chamber was discovered which housed a single skull which was surrounded by a ring of stones (Harvati & Harrison 2010; Mellars 1996). Moreover, Neanderthals buried bears at a number of sites including Regourdou. At Drachenloch they buried stone "cysts" containing bear skulls (Kurten 1976); hence, "the clan of the cave bear."

FIGURE: Neanderthal burial. This Neanderthal was buried with 7 different types of flowers.

Yet others were buried with large bovine bones above the head, with limestone blocks placed on top of the head and shoulders, and with heads severed coupled with evidence of ritual decapitation, facial bone removal, and cannibalism (Belfer-Cohen and Hovers 1992; Binford 1968; Harold 1980; Smirnov 1989; Solecki 1971). In one site, dated to over 100,000 years B.P., Neanderthals decapitated eleven of their fellow Neanderthals, and smashed their faces beyond recognition.

It therefore seems apparent that Neanderthals not only engaged in complex rituals, but they believed in spirits, ghosts, and a life after death. Hence the sleeping position, stone pillows, stone tools and food. They were preparing the departing spirit for the journey to the Hereafter and the land of dreams. However, they were also incapacitating their enemies, even after death, to prevent these souls from terrorizing the living or their dreams

FIGURE: Neanderthal burial.

3. SPIRITS, SOULS, GHOSTS & THE LAND OF DREAMS

The fact that so many of the Neanderthal dead were buried in a sleeping position implies an association between sleep and dreams. Since all vertebrates so far studied demontrate REM (dream) sleep, it can be assumed that Neanderthals dreamed. Among ancient (and even modern peoples) it was believed that souls and spirits could wonder about while people sleep and dream (Brandon 1967; Frazier 1950; Harris 1993; Jung 1945, 1964; Malinowkski 1990). Some believed the soul could escape the body via the

mouth or nostrils while dreaming and that the spirit could leave the body and engage in various purposeful acts or interact with other souls including the soul or spirit of those who had died. The spirit and soul were believed to hover about in human-like, ghostly vestiges, at the fringes of reality, the hinterland where day turns into night (Campbell 1988; Frazier 1950; Jung 1964; Malinowski 1954; Wilson 1951); and it is at night when people dream.

And as is the case with modern day humans, it can be assumed the ancients, including Neanderthals, had dreams by which they were transported or exposed to a world of magic and untold wonders which obeyed its own laws of time, space, and motion. It is through dreams that humans came to believe the spiritual world sits at the boundaries of the physical, where day turns to dusk, the hinterland of the mind where imagination and dreams flourish and grow (Frazier, 1950; Jung, 1945, 1964; Malinowkski, 1954); hence the tendency to bury the dead in a sleeping position even 100,000 years ago.

It is also via dreams that humans came to know that spirits and lost souls populated the night. The dream was real and so too were the ghosts, gods and demons who thundered and condemned and the phantoms that hovered at the edge of night. Although but a dream, like modern humans, our ancient ancestors experienced this through the senses, much as the physical world is

experienced. Dreams were real and they were taken seriously. Moreover, during dreams, both the living and the dead may be encountered. Thus, we can surmise that Neanderthals had similar dreams and may have dreamed about ghosts and wondering spirits,

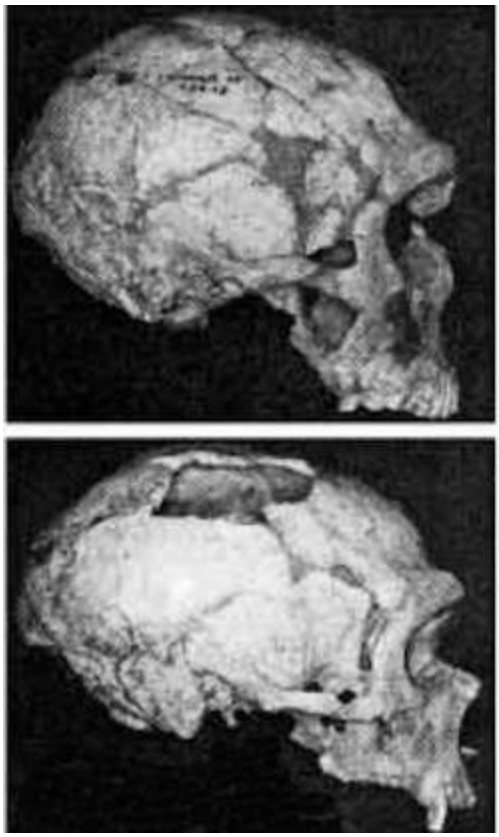
It is also appears that they feared the dead, and were terrified by the prospect that certain souls might haunt the living. They were afraid of ghosts, and frightened by the possibility that just as one might awake from sleep after visiting the land of the dead, the dead might also awake from this deathlike slumber. The dead, or at least their personal souls, had to be prevented from causing mischief among the living; especially dreaded enemies who had been killed. Hence, the ritual decapitation, facial bone removal, the smashing of faces, the removal of arms, hands, and legs, and placement of heavy stones upon the body.

It can be concluded, therefore, that almost 100,000 years ago, primitive humans had already come to believe in ghosts, souls, spirits, and a continuation of "life" after death. And, they also took precautions, in some cases, to prevent certain spirits and souls from being released from a dead body and returning to cause mischief among the living, which is why, in the case or powerful enemies, the Neanderthals would cut off heads and hands. They went to great lengths to obliterate all aspects of that dreaded individual's personal identity; e.g., smashing the face beyond recognition.

Of course, the fact that these Neanderthals were buried does not necessarily imply that they held a belief in "God." Rather, what the evidence demonstrates is that Neanderthals were capable of very intense emotions and feelings ranging from murderous rage to love to spiritual and superstitious awe. Although no god is implied, Neanderthals held spiritual and mystical beliefs involving the transmigration of the soul and all the horrors, fears, and hopes that accompany such feelings and beliefs. Although the Neanderthals had not discovered god, they stood upon the threshold.

4. THE NEANDERTHALS: A CHARACTER STUDY

Neanderthals were short, brutish, and an exceedingly violent, murderous people, as the remnants of their skeletons preserved for so many eons attests. Many of their fossils still betray the cruel ravages of deliberately and violently inflicted wounds (Conrad & Richter 2011; Harvati & Harrison 2010; Mellars 1996).



FIGURES: (Left) Two well preserved crania from northern European male Neanderthals. Reproduced from M. H. Wolpoff (1980), Paleo-Anthropology. New York, Knopf. (Right) Neanderthal Male. Reproduced from Howells, 1997. Getting Here. Compass Press, Washington D.C.

They also appear to have systematically engaged in female infanticide, and displayed a willingness to eat almost anything on four or two legs—including other Neanderthals. In one site, dated to over 100,000 years B.P., Neanderthals decapitated eleven of their fellow Neanderthals, and then enlarged the base of each skull (the foramen magnum) so the brains could be scooped out and presumably eaten. Even the skulls of children were treated in this fashion.

In fact, they would throw the bones and carcasses of other Neanderthals into the refuse pile. In one cave, a collection of over 20 Neanderthals were found mixed up with the remains of other animals and garbage. Presumably, these were enemies or just hapless strangers, innocent cave dwellers who were attacked and sometimes eaten after being brutally killed.

Hence, with the obvious exception o f “friends,” mates, and family,

Neanderthals often saw one another as a potential meal, and had almost no regard for a stranger's innate humanness. These were a violent, murderous, ritualistic people, and strangers were often brutally killed and eaten.

These characteristics are also associated with religious fervor. Among ancient and present day peoples, violence, murder, ritual cannibalism, and the sacrifice of children are common religious practices. The Five Books of Moses, are replete with stories of the mass murder and the genocide of non-Jews who were seen as subhuman, including pregnant women and children.

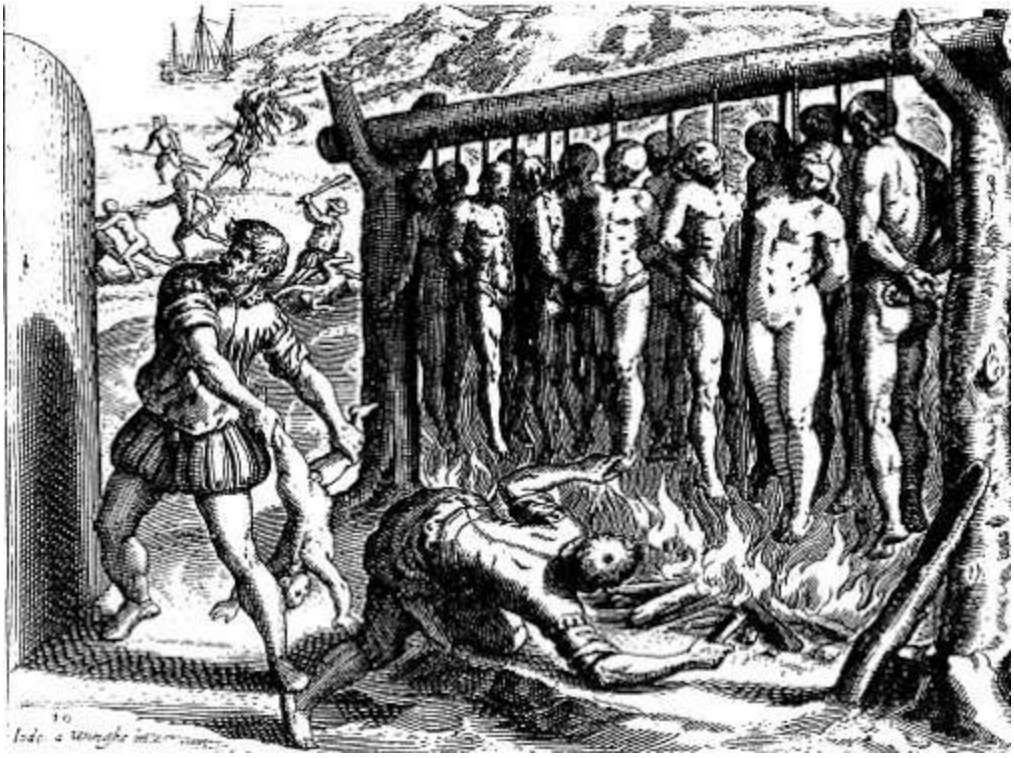


FIGURE: Aztec and Indian natives were burnt alive in groups of 13 to honor Jesus Christ and his 12 disciples.

"...when you approach a town, you shall lay seizure to it, and when the Lord your god delivers it into your hand, you shall put all its males to the sword.... In the towns of the people which the Lord your god is giving you as a heritage, you shall not let a soul remain alive." Exodus 20:15-18; Deuterotomy 20:12-16.

"When Israel had killed all the inhabitants of Ai....and all of them, to the

last man had fallen by the sword, all the Isrealites turned back to Ai and put it to the sword...until all the inhabitants of Ai had been exterminated... and the king of Ai was impaled on a stake and it was left lying at the entrance to the city gate." Deuteronomy 8:24-29.

I polluted them with their own offerings, making them sacrifice all their first-born, which was to punish them, so that they would learn that I am Yahweh (Ezekiel 20:25-36. See also Ezekiel 22:28-29). "This very day you defile yourselves in the presentation of your gifts by making your children pass through the fire of all your fetishes." (Ezekiel 20:31). "A blessing on him who seizes your babies and dashes them against rocks." (Psalm 137:9).

As is well known, the Spanish and Catholic missionaries, acting at the behest of the Catholic Popes (and their Spanish/Catholic Sovereigns), continued these genocidal practices once they invaded the Americas during the 1500's and up through the 19th century. As the Catholic Dominican Bishop Bartolom de Las Casas reported to the Pope: the Aztec and Indian natives were hung and burnt alive "in groups of 13... thus honoring our Savior and the 12 apostles."

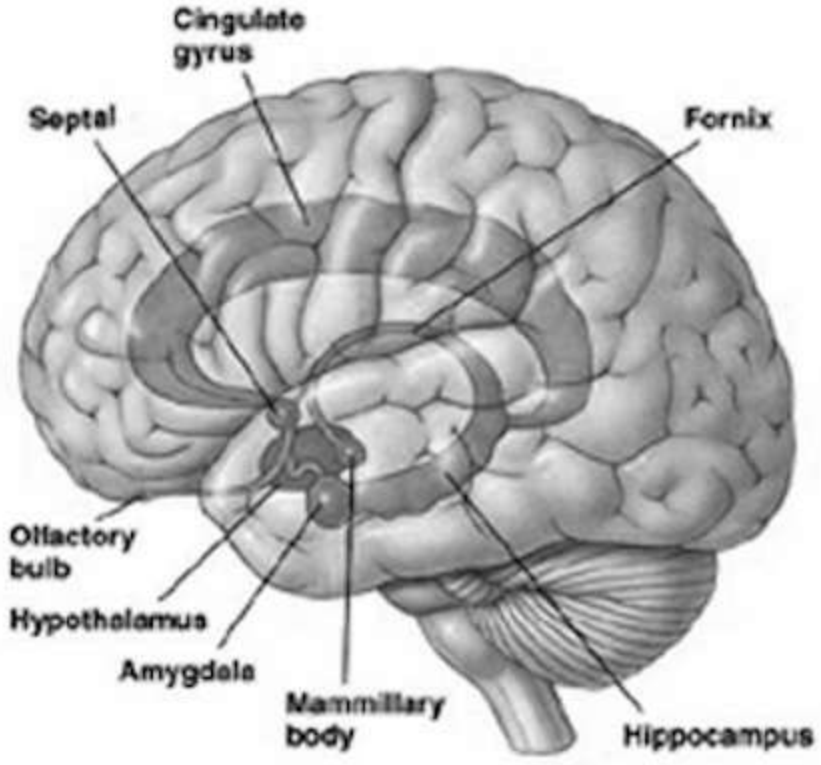
5. The Limbic System: Love, Violence, & Spirituality.

Violence and murder are also under the control of the limbic system, the amygdala in particular (Joseph 1992, 1994, 1996, 1998). And it is the limbic system which mediates religious and spiritual experience and which provides much of the emotion and imagery which appears in dreams (Joseph 1988, 2000a, 2001, 2002).

However, it is also the limbic system which subserves feelings of love and affection, and the ability to form long-term attachments. Thus we see that Neanderthals provided loving care for friends and family who had been injured or maimed, enabling them to live many more years despite their grievous injuries. For example, the skeleton of one Neanderthal male, who was about age 45 when he died, had been nursed for a number of years following profoundly crippling injuries. His right arm had atrophied, and his lower arm and hand had apparently been ripped or bitten off, and his left eye socket, right shoulder, collarbone, and both legs were badly injured. Obviously someone loved and tenderly cared for this man. He was no doubt a father, a husband, a brother, and son, and someone in his family not only provided long term loving care to make him comfortable in this life, but

prepared him for the next life as well (Mellars 1996).

The ability to feel love is a function of the limbic system, the amygdala in particular which is buried in the depths of the temporal lobe.



6. THE NEANDERTHAL BRAIN & TEMPORAL LOBES

An examination of Neanderthal skulls and endocasts of the inner skull provides a gross indication of the size and configuration of their brains. Based on physical indices, the temporal lobe was well developed and little different from that of modern humans.

FIGURE: (Left)Neanderthal. (Right) Modern human.

Likewise, given the great antiquity of the limbic system, it can be surmised that the Paleolithic human limbic system was well developed, and similar to the limbic system of modern humans (Joseph 2000a, 2001; 2002).

The Neanderthals were not a very intelligent or tidy people and were unable to fashion complex tools which, along with other indices, suggests they were unable think complex thoughts. Yet they were people of passion who experienced profound emotions and love; made possible by the limbic system and temporal lobe. In fact, it is because they had the limbic capacity to experience love, spiritual awe, and religious concerns, that these expressions of love continued following death of those they loved, as it has been conclusively demonstrated that these brain structures mediate these functions (Joseph 1992, 1994, 1998a, 2001, 2002). Thus the Neanderthals carefully buried their dead, providing them with food and even sprinkling the bodies with seven different types of blooming, blossoming, fragrant flowers (Belfer-Cohen & Hovers, 1992; McCown, 1937; Solecki 1971; Trinkaus, 1986).

In overall size, the posterior portion of the Neanderthal brain, i.e. the occipital and superior parietal lobes, were slightly larger in length and breadth than the modern human brain on average (Joseph 1996, 2000b; Wolpoff, 1980); a reflection of the environment in which they dwelled and the neural capacities their life style required-the body moving in visual space as Neanderthals spent most of their non-sleeping hours searching for food. The occipital and superior parietal areas are directly concerned with visual analysis and positioning the body in space (Joseph 1986, 1996). As male and female Neanderthals spent a considerable amount of their time engaged in hunting activities, scanning the environment for prey and running and throwing in visual space were more or less ongoing concerns. A large

occipital and superior parietal lobe would reflect these activities.

By contrast, concerns about the dead, and attendant mortuary rituals are activities linked to the temporal lobes. The temporal lobes and underlying limbic structures (amygdala, hippocampus), could be likened the seat of the soul and the senior executive of the personality. It is the temporal lobes and the amygdala and hippocampus which have been directly implicated in the generation of religious feelings and supernatural experiences including visions of floating above the body, seeing angels and devils, and what has been described as the after-death and near-death experiences (Joseph 1996, 1998b, 1999a,b, 2000a, 2001, 2002).

The amygdala (which is buried in the depths of the anterior temporal lobe) enables us to hear "sweet sounds," recall "bitter memories," or determine if something is spiritually significant, sexually enticing, or good to eat and makes it possible to experience the spiritually sublime. It is concerned with the most basic animal emotions, and allows us to store affective experiences in memory or even to reexperience them when awake or during the course of a dream in the form of visual, auditory, or religious or spiritual imagery. The amygdala also enables an individual to experience emotions such as love and religious rapture, as well as the ecstasy associated with orgasm and the dread and terror associated with the unknown.

In fact, the amygdala (in conjunction with the hippocampus and overlying temporal lobe) contributes in large part to the production of very bizarre, unusual and fearful mental phenomenon including dissociative states, feelings of depersonalization, and hallucinogenic and dream-like recollections involving threatening men, naked women, the experience of god, as well as demons and ghosts and pigs walking upright dressed as people (Daly 1958; Gloor 1997; Halgren 1992; Horowitz et al. 1968; MacLean 1990; Penfield and Perot 1963; Schenk, and Bear 1981; Slater and

Beard 1963; Subirana and Oller-Daurelia 1953; Trimble 1991; Weingarten, et al. 1977; Williams 1956). Moreover, some individuals report communing with spirits or receiving profound knowledge from the Hereafter, following amygdala stimulation or abnormal activation (Penfield and Perot 1963; Subirana and Oller-Daurelia, 1953; Williams 1956).

Intense activation of the temporal lobe, hippocampus, and amygdala has been reported to give rise to a host of sexual, religious and spiritual experiences; and chronic hyperstimulation can induce an individual to become hyper-religious or visualize and experience ghosts, demons, angels, and even "God," as well as claim demonic and angelic possession or the sensation of having left their body (Bear 1979; Gloor 1992; Horowitz et al. 1968; MacLean 1990; Penfield and Perot 1963; Schenk, and Bear 1981; Weingarten, et al. 1977; Williams 1956).

Much of the visual, emotional, and hallucinatory aspects of dream sleep, have their source in the temporal lobe and underlying limbic system structures (Joseph 1992, 1994, 1996, 1998, 2001, 2002). It is the evolution of the temporal lobes, this "transmitter to god" which also explains why even primitive humanity likely believed in spirits, souls, and ghosts, and practiced complex mortuary rites for those they feared or loved.

7. THE BIG BANG IN SYMBOLIC THINKING: THE CRO-MAGNON FRONTAL LOBES

There is considerable evidence that over the course of human history, the temporal lobe evolved at a faster and earlier rate than the frontal lobe (Joseph 1996, 2000b, Gloor, 1997). Likewise, the temporal lobes mature more rapidly than the frontal lobes over the course of human ontological development (Joseph, 1982, 1996, 1998b, 1999a, 2000b,c).

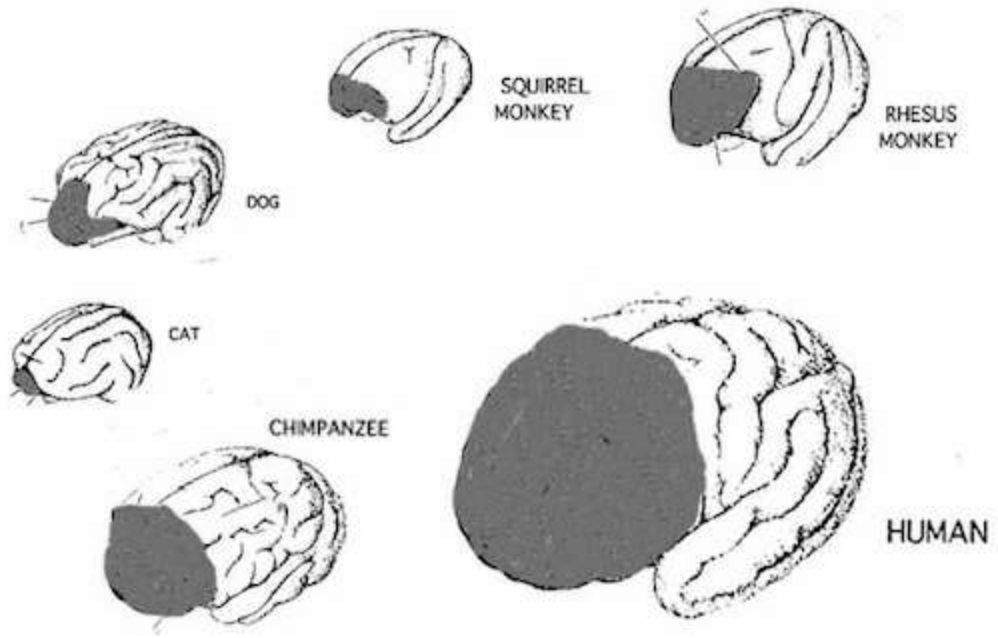
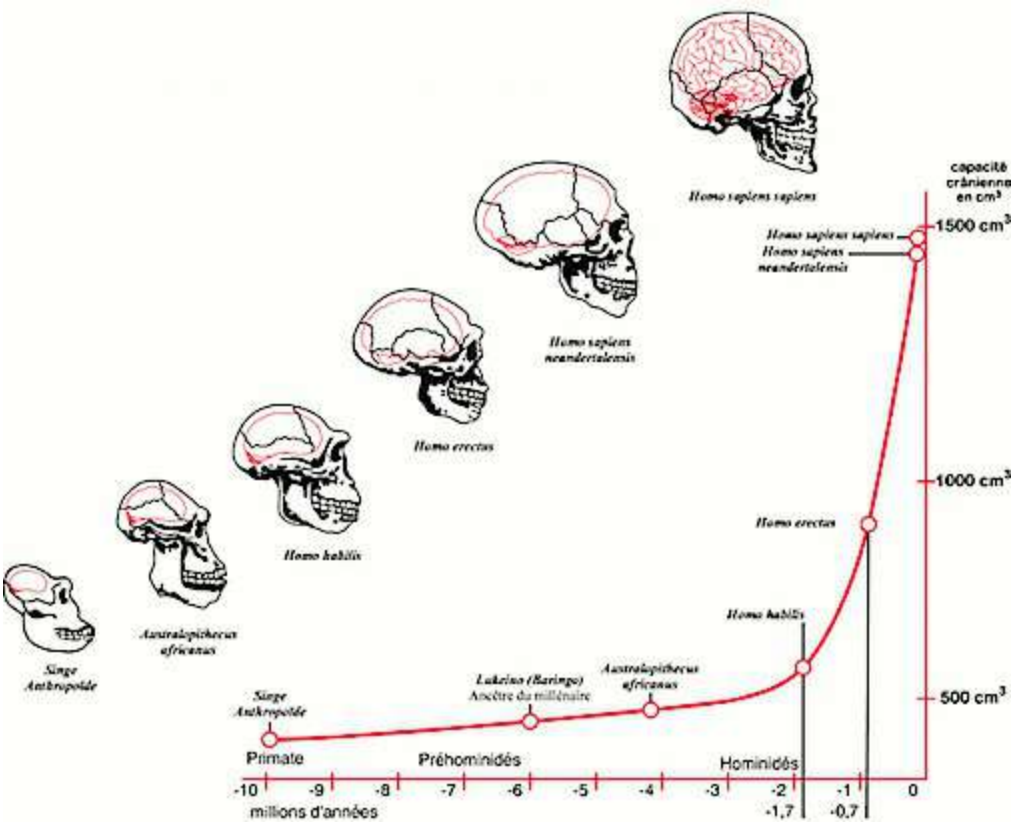


FIGURE: Comparison of the frontal lobes (red) in different species

The Neanderthals were blessed with a well developed temporal lobe, whereas more anterior regions of the brain, the frontal lobes, remained little different from more ancient ancestral primate species. However, with the evolution of the Cro-Magnon people, the brain mushroomed in size, with much of that development in the frontal lobes.

As based on cranial comparisons and endocasts of the inside of the skull, and using the temporal and frontal poles as reference points, it has been demonstrated that the brain has tripled in size over the course of human evolution, and that the frontal lobes significantly expanded in length and height during the Middle to Upper Paleolithic transition (Blinkov and Glezer 1968; Joseph 1993; MacLean 1990; Tilney 1928; Weil 1929; Wolpoff 1980).



It is obvious that the height of the frontal portion of the skull is greater in the six foot tall, anatomically modern Upper Paleolithic H. sapiens (Cro-Magnon) versus Neanderthal and archaic H. sapiens (Joseph 1996, 2000b; Tilney, 1928; Wolpoff 1980). The evolution and expansion of the frontal lobe is also evident when comparing the skills and creative and technological ingenuity of the Cro-Magnons, vs the Neanderthals (Joseph 1993, 1996, 2000b).

Therefore, whereas the temporal, occipital and parietal lobes were well developed in archaic and Neanderthals, the frontal lobes would increase in size by almost a third in the transition from archaic humans to Cro-Magnon (Joseph 1996, 2000a,b, 2001).

It is the evolution of the frontal lobes which ushered in a cognitive and creative big bang which gave birth to a technological revolution and complex spiritual rituals and beliefs in shamans and goddesses and their relationship to the heavens, and thus the moon and the stars.

Neanderthals died out as a species around 30,000 years ago; but for at least 10,000 years they shared the planet with the Cro-Magnon people. The Cro-Magnon men stood 6ft tall on average and the males and females were very

handsome and beautiful, with thin hips, aquiline noses, prominent chins, small even perfect teeth, and high rounded foreheads. There was nothing ape-like or Neanderthal about these people.

The Cro-Magnon cerebrum was also significantly larger than the Neanderthal brain, with volumes ranging from around 1600 to1880 cc on average compared with 1,033 to 1,681 cc for Neanderthals (Blinikov & Glezer 1968; Clark 1967; Day 1996; Holloway 1985; Roginskii & Lewin 1955; Wolpoff 1980). In fact, the Cro-Magnon brain is one third larger than the modern human brain, i.e. 1800 cc vs 1350 ccs. However, a distinguishing characteristic of the Cro-Magnon brain, was the massively developed frontal lobes.

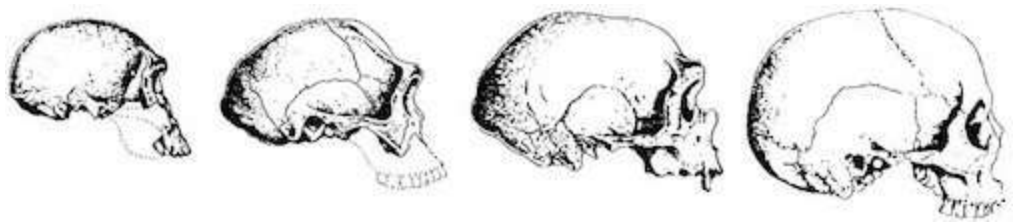


FIGURE: Comparison of the frontal cranium over the course of "evolution:" from Australopithecus, to H. Habilis, to H. erectus. to modern humans. Note obvious expansion of the anterior portion of the skull frontal lobe.

The frontal lobes are the senior executive of the brain and are responsible for initiative, goal formation, long term planning, the generation of multiple alternatives, and the consideration of multiple consequences (Joseph, 1986a, 1999a). The frontal lobes are the source of creativity, imagination, and what has been described as free will (Joseph 1996, 2011). Through interactional pathways maintained with brainstem, limbic system, thalamus and the primary receiving and association areas in the neocortex (Petrides & Pandya 1999, 2001)), the frontal lobes have access to every stage of information analysis, and are able to coordinate and regulate attention, memory, personality, and information processing throughout the brain so as to direct intellectual, creative, artistic, symbolic, and cognitive processes (Joseph, 1986a, 1999a).

It is well established that the frontal lobes enable humans to think symbolically, creatively, imaginatively, to plan for the future, to consider the

consequences of certain acts, to formulate secondary goals, and to keep one goal in mind even while engaging in other tasks, so that one may remember and act on those goals at a later time (Joseph 1986, 1990b, 1996, 1999c). Selective attention, planning skills, and the ability to marshal one's intellectual resources so as to to anticipate the future rather than living in the past, are capacities clearly associated with the frontal lobes.

The frontal lobes are associated with the evolution of "free will" (Joseph 1986, 1996, 1999c, 2011b) and the Cro-Magnon were the first species on this planet to exercise that free will, shattering the bonds of environmental/genetic determinism by doing what had never been done before: After they emerged upon the scene over 35,000 years ago, they created and fashioned tools, weapons, clothing, jewelry, pottery, and musical instruments that had never before been seen. They created underground Cathedrals of artistry and light, adorned with magnificent multi-colored paintings ranging from abstract impressionism to the surreal and equal to that of any modern master (Breuil, 1952; Leroi-Gourhan 1964, 1982). And they used their skills to carve the likeness of their female gods.

Thirty five thousand years ago, Cro-Magnon were painting animals not only on walls but on ceilings, utilizing rich yellows, reds, and browns in their paintings and employing the actual shape of the cave walls so as to conform with and give life-like dimensions, including the illusion of movement to the creature they were depicting (Breuil, 1952; Leroi-Gourhan 1964, 1982). Many of their engraving on bones and stones also show a complete mastery of geometric awareness and they often used the natural contours of the cave walls, including protuberances, to create a 3-dimensional effect (Breuil, 1952; Leroi-Gourhan 1964, 1982).

The drawing or carving often became a harmonious or rather, an organic part of the object, wall, ceiling, or tool upon which it was depicted. The Cro-Magnon drew and painted scenes in which animals mated, defecated, fought, charged, and/or were fleeing and dying from wounds inflicted by hunters. The Cro-Magnon cave painters were exceedingly adept at recreating the scenes of everyday life. Moreover, most of the animals were drawn to scale, that is, they were depicted in their actual size; and all this, 30,000 years ago (e.g. Chauvet, et al., 1997).

They created art that was meant to be looked at, owned and admired, and for trade, as jewelry and household decorations, and as highly prized possessions as well as for religious reverence. Picasso was awestruck by these Paleolithic masterpieces, and complained that although 30,000 years had elapsed, “we have learned nothing new. We have invented nothing.”

With the evolution of the Cro-Magnon people, the frontal lobes mushroomed in size and there followed an explosion in creative thought and technological innovation. The Cro-Magnon were intellectual giants. They were accomplished artists, musicians, craftsmen, sorcerers, and extremely talented hunters, fishermen, and highly efficient gatherers and herbalists. And they were the first to contemplate the heavens and the cosmos which they symbolized in art.

From the time of Homo Erectus (1.9 million to 500,000 B.P), humans had utilized fire to keep warm, to provide light, to cook their food, and to ward off animals. However, the Cro-Magnon learned over 30,000 years ago how to make fire using the firestone; iron pyrite which when repeatedly struck with a flint makes sparks which can easily ignite brush. They also created the first rudimentary blast furnaces which were capable of emitting enormous amounts of heat, so as to fire clay. This was accomplished by digging a tiny tunnel into the bottom of the hearth which allowed air to be drawn in. Indeed, 30,000 years ago these people were making fire hardened ceramics and clay

figures of animals and females with bulging buttocks and breasts—which are presumed to be the first goddesses and fertility fetishes(Breuil, 1952; Leroi-Gourhan 1964).

Many of these female figurines were shaped so that they tapered into points so they could be stuck into the ground or into some other substance either for ornamental or supernatural purposes, e.g., household goddesses, fertility figures, and earth mothers (Breuil, 1952). In fact, much of the art produced, be it finely crafted "laurel leafs" or other artistic masterpieces, served ritual, spiritual, and esthetic functions.

It is the evolution of the Cro-Magnon and their massive frontal lobes which ushered in a cognitive and creative big bang which gave birth to complex spiritual rituals and beliefs in shamans, goddesses, and the cosmos (Joseph 2001, 2001, 2002).

By contrast, Neanderthals, archaics, and other peoples of the Middle Paleolithic were not very smart, and lived in the "here and now." They had little capacity for creative or abstract thought, and constructed and made and used the same simple stone tools over and over again for perhaps 200,000 years, until around 35,000 B.P., with little variation or consideration of alternatives (Binford, 1982; Gowlett, 1984; Mellars, 1989, 1996).

FIGURE: Neanderthal tools.

As neatly summed up by Hayden (1993, p. 139), “as a rule, there is no evidence of private ownership or food storage, no evidence for the use of economic resources for status or political competition.... no ornaments or other status display items, no skin garments requiring intensive labor to produce, no tools requiring high energy investments, no intensive regional exchange for rare items like sea shells or amber, no competition for labor to produce economic surpluses and no corporate art or labor intensive rituals in deep cave recesses to impress onlookers and help attract labor.”

Neanderthals greatly lacked in creativity, initiative, imagination, and tended to create simple stone tools that served a single purpose. They tended to live in the immediacy of the present, with little ability to think about or consider the distant future or engage in creative or abstract thought (Binford, 1973, 1982; Dennell, 1985; Mellars, 1989, 1996). These are capacities associated with the frontal lobes.

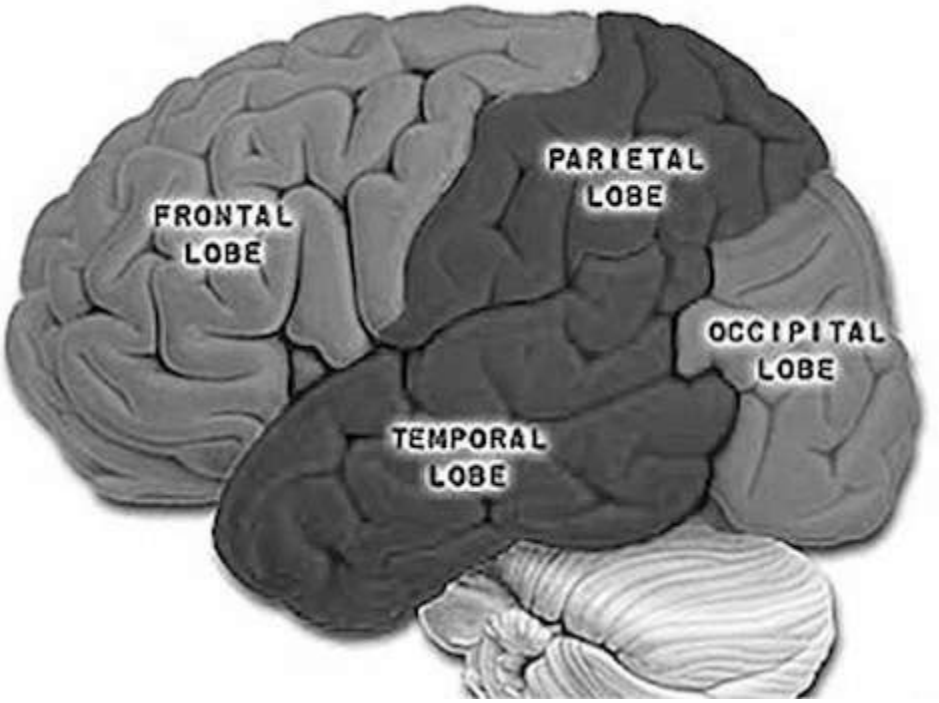


FIGURE: Lobes of the brain

About one third of the frontal lobe, i.e. the motor areas, are concerned with initiating, planning, and controlling the movement of the body and fine motor functioning (Joseph 1990b, 1999c). It is this part of the "archaic" and Neanderthal frontal lobe that appears to be most extensively developed. However, the more anterior frontal lobes are concerned with wholly different functions ranging from creative thought to analytical and planning skills (Joseph 1986, 1996, 1999c), and it is this region of the brain which exploded in size with the evolution of the Cro-Magnon people.

Thus, whereas mortuary rites and primitive spirituality can be associated with the temporal lobes and the Neanderthals, it was not until the evolutionary expansion of the non-motor regions of the frontal lobes that spirituality and concepts of the soul could be expressed through abstract symbolism. Therefore, the evolution of spirituality preceded abstract concepts which could be associated with religiosity; all of which in turn are directly linked to the differential evolution of the frontal and temporal lobes.

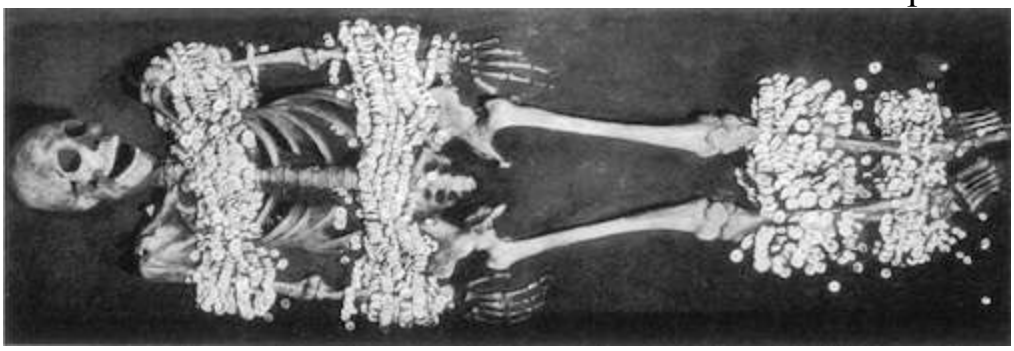


FIGURE (above and below) Upper Paleolithic Cro-Magnons buried with tools, ornaments, hunting implements, and other essentials.

Cro-Magnon Cosmology and the Frontal Lobes

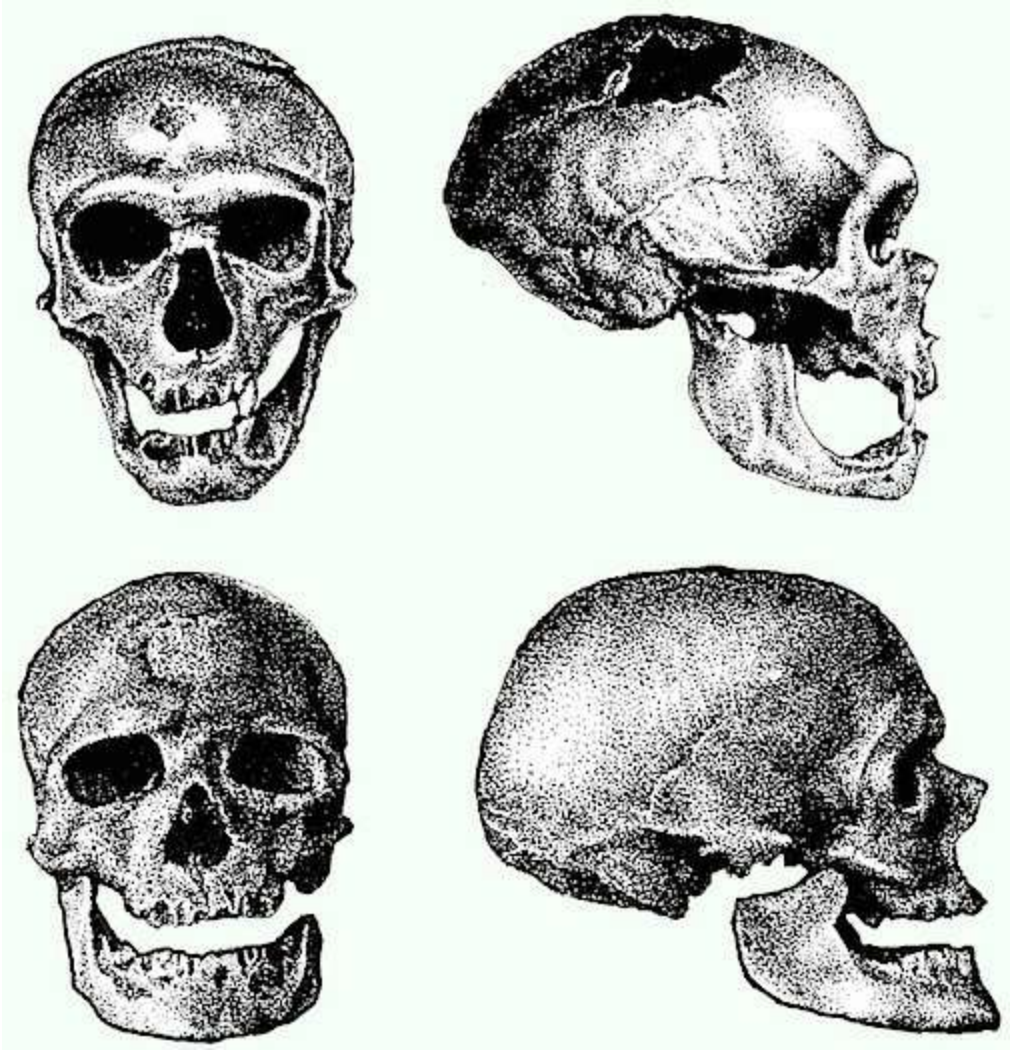


Figure: Neanderthal (top), Cro-Magnon (bottom)

When humans first turned their eyes to the sun, moon, and stars to ponder the nature of existence and the cosmos, is unknown. The Cro-Magnon people were keen observers of the world around them, which they depicted with artistic majesty. The heavens were part of their world and they searched the skies for signs and observed the moon, the patterns formed by clusters of stars, and perhaps the relationship between the Earth, the sun, and the changing seasons. Although it is impossible to date cave paintings with precision, the first evidence of this awareness of the cosmic connection between Sun, Moon, Woman, Earth and the changing seasons are from the Paleolithic; symbolized in the creations of the Cro-Magnon of the Paleolithic.

As based on cranial comparisons and endocasts of the inside of the skull, and using the temporal and frontal poles as reference points, it has been demonstrated that the brain has tripled in size over the course of human evolution, and that the frontal lobes significantly expanded in length and height during the Middle to Upper Paleolithic transition (Blinkov and Glezer 1968; Joseph 1993; MacLean 1990; Tilney 1928; Weil 1929; Wolpoff 1980).

It is obvious that the height of the frontal portion of the skull is greater in the six foot tall, anatomically modern Upper Paleolithic H. sapiens (Cro-Magnon) versus Neanderthal and archaic H. sapiens (Joseph 1996, 2000b; Tilney, 1928; Wolpoff 1980). The evolution and expansion of the frontal lobe is also evident when comparing the skills and creative and technological ingenuity of the Cro-Magnons, vs the Neanderthals (Joseph 1993, 1996, 2000b).

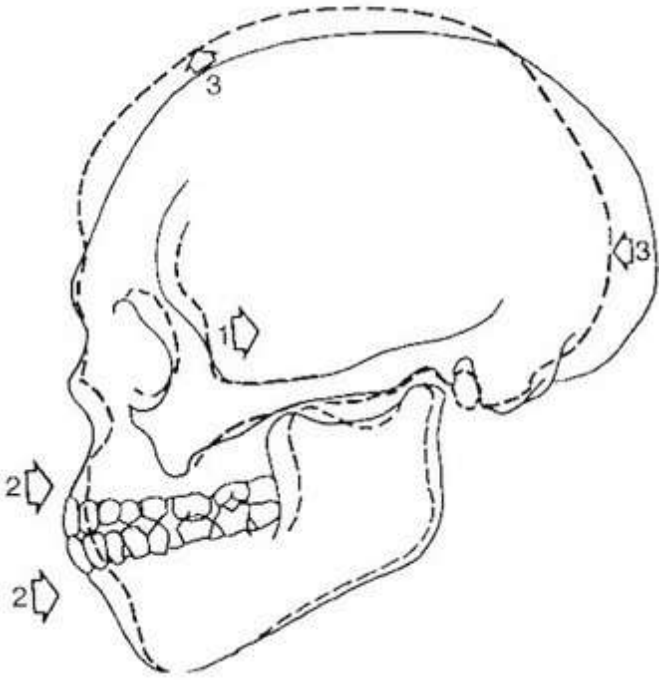
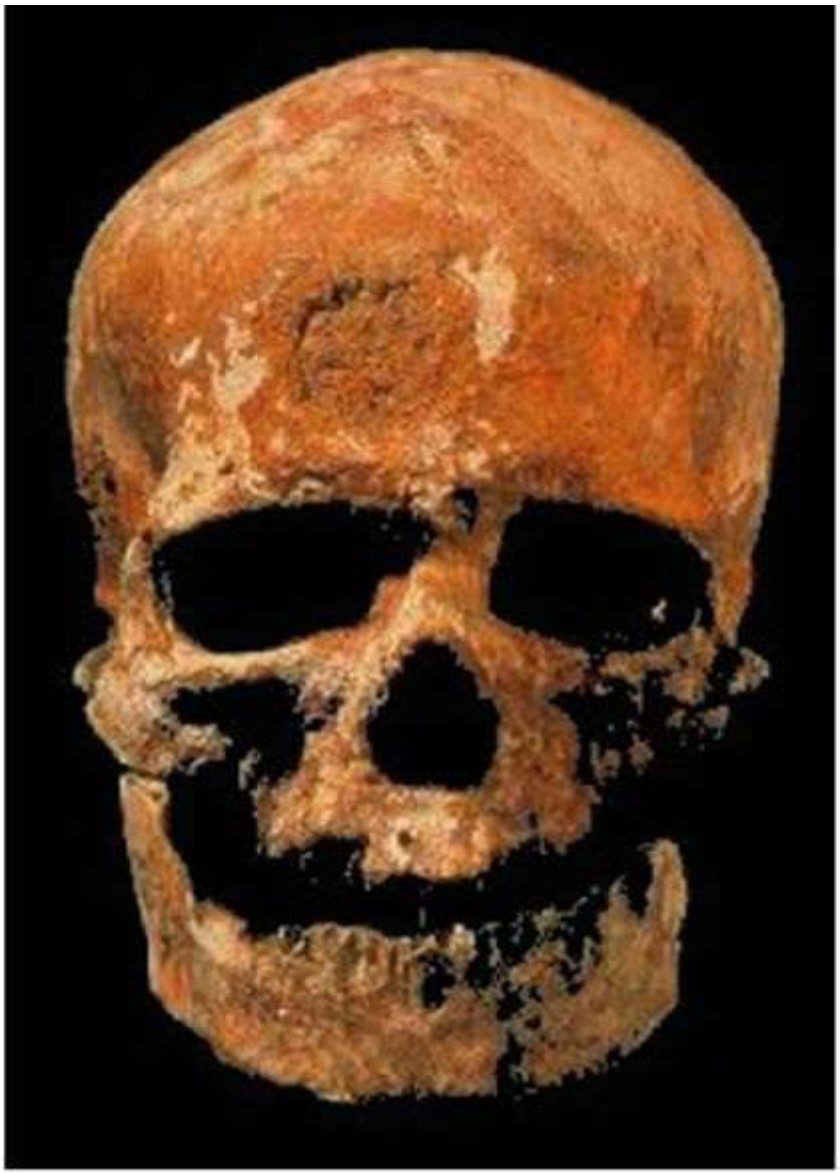


FIGURE A modern (dotted line) mesolithic cranium compared with a more ancient cranium (solid line). Arrows indicate the main average changes in skull structure including a reduction in the length of the occiput and an increase and upward expansion in the frontal cranial vault. Reproduced from M. H. Wolpoff (1980), PaleoAnthropology. New York, Knopf.

Therefore, whereas the temporal, occipital and parietal lobes were well developed in archaic and Neanderthals, the frontal lobes would increase in size by almost a third in the transition from archaic humans to Cro-Magnon (Joseph 1996, 2000a,b, 2001). It is the evolution of the frontal lobes which ushered in a cognitive and creative big bang which gave birth to a technological revolution and complex spiritual rituals and beliefs in shamans and goddesses and their relationship to the heavens, and thus the moon and the stars.

FIGURE: Cro-Magnon



It is well established that the frontal lobes enable humans to think symbolically, creatively, imaginatively, to plan for the future, to consider the consequences of certain acts, to formulate secondary goals, and to keep one goal in mind even while engaging in other tasks, so that one may remember and act on those goals at a later time (Joseph 1986, 1990b, 1996, 1999c). Selective attention, planning skills, and the ability to marshal one's intellectual resources so as to to anticipate the future rather than living in the past, are capacities clearly associated with the frontal lobes.

The frontal lobes are associated with the evolution of "free will" (Joseph 1986, 1996, 1999c, 2011b) and the Cro-Magnon were the first species on this

planet to exercise that free will, shattering the bonds of environmental/genetic determinism by doing what had never been done before: After they emerged upon the scene over 35,000 years ago, they created and fashioned tools, weapons, clothing, jewelry, pottery, and musical instruments that had never before been seen. They created underground Cathedrals of artistry and light, adorned with magnificent multi-colored paintings ranging from abstract impressionism to the surreal and equal to that of any modern master (Breuil, 1952; Leroi-Gourhan 1964, 1982). And they used their skills to carve the likeness of their female gods.

FIGURE: Paleolithic Goddess

Thirty five thousand years ago, Cro-Magnon were painting animals not only on walls but on ceilings, utilizing rich yellows, reds, and browns in their paintings and employing the actual shape of the cave walls so as to conform with and give life-like dimensions, including the illusion of movement to the creature they were depicting (Breuil, 1952; Leroi-Gourhan 1964, 1982).

Many of their engraving on bones and stones also show a complete mastery of geometric awareness and they often used the natural contours of the cave walls, including protuberances, to create a 3-dimensional effect (Breuil, 1952; Leroi-Gourhan 1964, 1982).

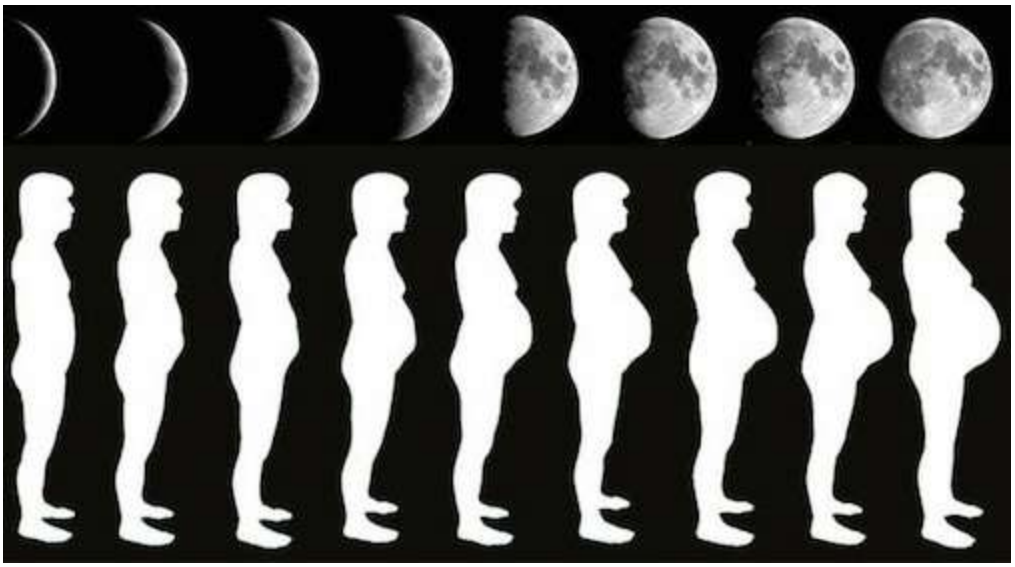
With the evolution of the Cro-Magnon people, the frontal lobes mushroomed in size and there followed an explosion in creative thought and technological innovation. The Cro-Magnon were intellectual giants. They were accomplished artists, musicians, craftsmen, sorcerers, and extremely talented hunters, fishermen, and highly efficient gatherers and herbalists. And they were the first to contemplate the heavens and the cosmos which they symbolized in art.

FIGURE: The cosmic clock and some of the constellation symbolized by bulls in the Lascaux Cave in Dordogne? There is a group of dots on the back of the bull to the far right (Taurus) which may represent the Pleiades (the seven sisters).

2. GODDESS OF THE MOON

Among the ancients, the Sun and the Moon were of particular importance and the Cro-Magnon observed the relationship between woman and the lunar cycle. Consider, the pregnant goddess, the Venus of Laussel, who holds the crescent moon in her hand (though others say it is a bison's horn). Although

the length of a Cro-Magnon woman's menstrual cycle is unknown, it can be assumed that like modern woman she menstruated once every 28 to 29 days, which corresponds to a lunar month 29 days long, and which averages out to 13 menstrual cycles in a solar year. And not just menstruation, but pregnancy is linked to the phases of the moon.



3. THE FOUR CORNERS OF THE SOLAR CLOCK.

When the Cro-Magnon turned their eyes to the heavens, seeking to peer beyond the mystery that separated this world from the next, they observed the sun. With a brain one third larger than modern humans, and given their tremendous power of observation, it can be predicted these ancient people would have associated the movement of the sun with the changing seasons which effected the behavior of animals, the growth of plants, and the climate and weather; all of which are directly associated with cyclic alterations in the position of the sun and the length of a single day over the course of a solar year which is equal to 13 moons.

FIGURE: The entrance to the underground Upper Paleolithic cathedral. The Chauvet cave. Note the sign of the cross. Reprinted from Chauvet et al., (1996). Dawn of Art: The Chauvet Cave. Henry H. Adams. New York.

The four seasons, marked by two solstices and the two equinoxes have been symbolized by most ancient cultures with the sign of the cross, e.g. the "four corners" of the world and the heavens. The "sign of the cross" generally signifies religious or cosmic significance. The Cro-Magnon also venerated the sign of the cross, the first evidence of which, an engraved cross, is at least 60,000 years old (Mellars, 1989). Yet another cross, was painted in bold red ochre upon the entryway to the Chauvet Cave, dated to over 30,000 years ago (Chauvet et al., 1996).

The illusion of movement of the Sun, from north to south, and then back

again, in synchrony with the waxing and waning of the four seasons, is due to the changing tilt and inclination of the Earth's axis, as it spins and orbits the sun. Thus over a span of 13 moons, it appears to an observer that the days become shorter and then longer and then shorter again as the sun moves from north to south, crosses the equator, and then stops, and heads back north again, only to stop, and then to again head south, crossing the equator only to again stop and head north again. The two crossings each year, over the equator (in March and September) are referred to as equinoxes and refers to the days and nights being of equal length. The two time periods in which the sun appears to stop its movement, before reversing course (June and December), are referred to as solstices—the "sun standing still."

The sun was recognized by ancient astronomer priests, as a source of light and life-giving heat, and as a keeper of time, like the hands ticking across the face of a cosmic clock. Because of the scientific, religious, and cosmological significance of the sun, ancient peoples, in consequence, often erected and oriented their religious temples to face and point either to the rising sun on the day of the solstice (that is, in a southwest—northeast axis), or to face the rising sun on the day of the equinox (an east-west axis). For example, the ancient temples and pyramids in Egypt were oriented to the solstices, whereas the Temple of Solomon faced the rising sun on the day of the equinox.

Thus the sign of the cross is linked to the heavens and to the sun. Understanding the heavens and the sun, has been been a common astronomical method of divining the the will of the gods, and for navigation, localization, and calculation: these celestial symbols have heavenly significance.

Regardless of time and culture, from the Aztecs, Mayans, American Indians, Romans, Greeks, Africans, Christians, Cro-Magnons, Egyptians (the key of life), and so on, the cross consistently appears in a mystical context, and/or is attributed tremendous cosmic significance (Budge,1994; Campbell, 1988; Joseph, 2000a; Jung, 1964). The sign of the cross was the ideogram of the goddess "An", the Sumerian giver of all life from which rained down the seeds of life on all worlds including the worlds of the gods. An of the cross gave life to the gods, and to woman and man.

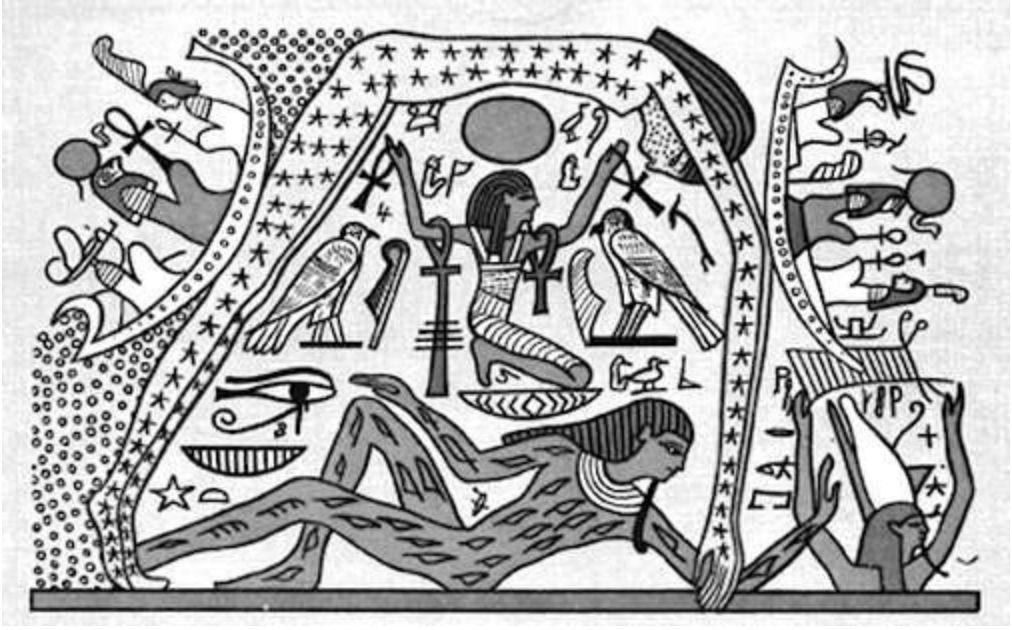


FIGURE: The God Seb supporting the Goddess Nut who represents heaven and possibly the Milky Way galaxy. Note the repeated depictions of the key of life; i.e. a ring with a cross at the end.

The symbol of the cross is in fact associated with innumerable gods and goddesses, including Anu of the ancient Egyptians, the Egyptian God Seb, the Goddess Nut, the God Horus (the hawk), as well as Christ and the Mayan and Aztec God, Quetzocoatl. For example, like the Catholics, the Mayas and Aztecs adorned their temples with the sign of the cross. Quetzocoatl, like Jesus, was a god of the cross.

In China the equilateral cross is represented as within a square which represents the Earth, the meaning of which is: “God made the Earth in the form of a cross.” It is noteworthy that the Chinese cross-in-a-box can also be likened to the swastika—also referred to as the “gammadion” which is one of the names of the Lord God: “Tetragammadion.” The cross, in fact forms a series of boxes when aligned from top to bottom or side by side, and cross-hatchings such as these were carved on stone over 60,000 years ago.

FIGURE: Quetzocoatl the Mayan and Aztec god of the cross. The round shield encircling the cross represents the sun.

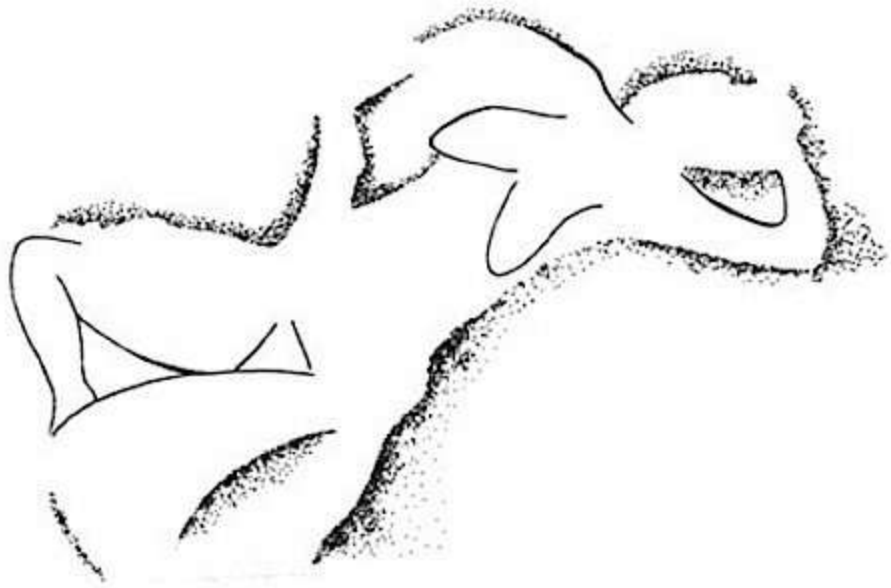
FIGURE: Ochre etched with crosses, forming a series of cross-hatchings, dating to 77,000 years ago.

FIGURE: Sign of the cross (far left)

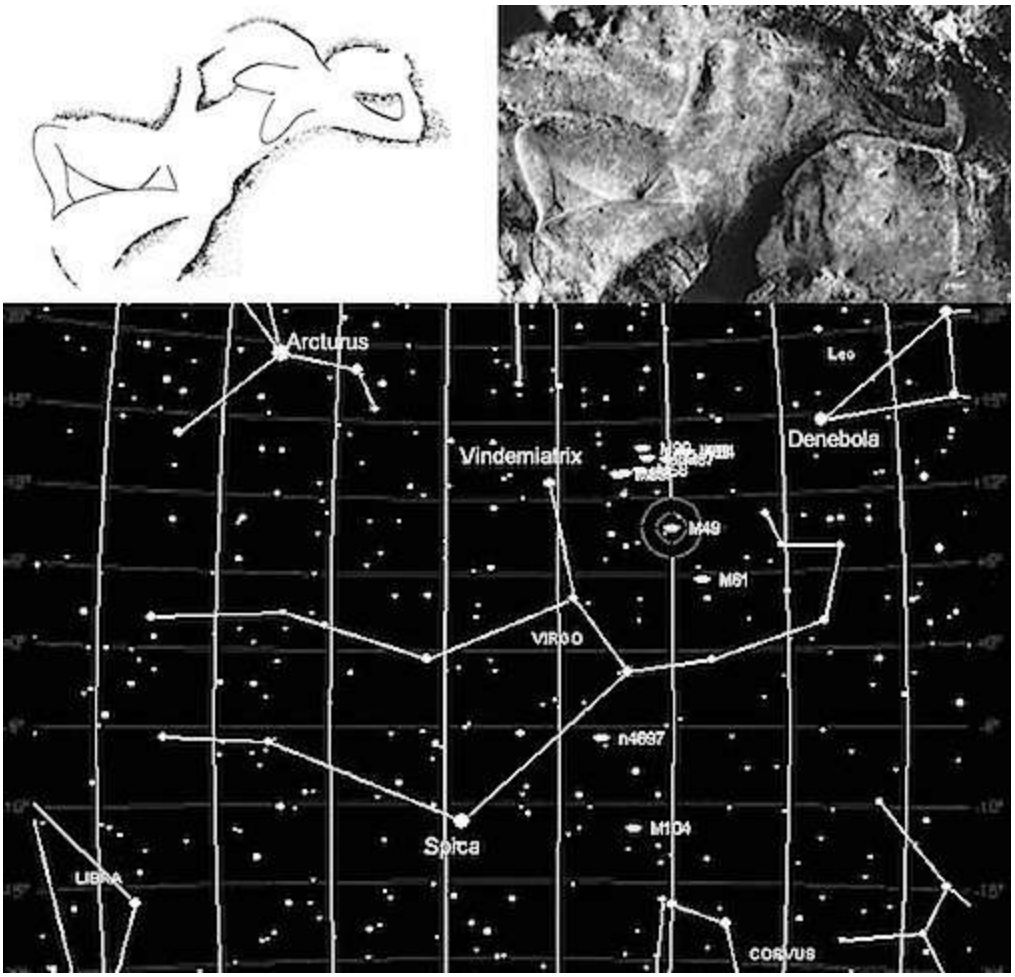
Among the ancient, the sign of the cross, represented the journey of the sun across the four corners of the heavens. The Cro-Magon adorned the entrance and the walls of their underground cathedrals with the sign of the cross, which indicates this symbol was of profound cosmic significance. However, that some of the Cro-Magnon depictions of animal-headed men have also been found facing the cross, may also pertain to the heavens: the patterns formed by stars, which today are refereed to as “constellations.”

4.. THE CONSTELLATION OF VIRGO

here is nothing “virginal” about the constellation of Virgo. The pattern can be likened to a woman in lying on her back with an arm behind her head, and this may have been the visage which stirred the imagination of the Cro-Magnon.



FIGURES (above and below) Cro-Magnon / Paleolithic goddess, depicting the constellation of Virgo. La Magdelain cave.



5. THE CONSTELLATIONS OF OSIRIS

It would be unreasonable to assume that the Cro-Magnon would not have observed the heavens or the illusory patterns formed by the alignment of various stars. Depictions of the various constellations, such as Taurus and Orion, and "mythologies" surrounding them, are of great antiquity, and it appears that similar patterns were observed by the Cro-Magnon people.

Consider, for example the "Sorcerers" or "Shamans" wearing the horns of a bull, and possibly representing the constellation of Taurus; a symbol which appears repeatedly in Lascaux, the "Hall of the Bulls" and in the deep recesses of other underground cathedrals dated from 18,000 to 30,000 B.P. And above the back of one of these charging bulls, appears a grouping of dots, or stars, which many authors believe may represent the Pleiades which is associated with Taurus. These Paleolithic paintings of the bull appear to be

the earliest representation of the Taurus constellation.

FIGURE: Ancient shaman attired in animal skins and stag antlers, graces the upper wall directly above the entrance to the 20,000-25,000 year-old grand gallery at Les Trois-Freres in southern France. Possibly representing the constellation of Orion.

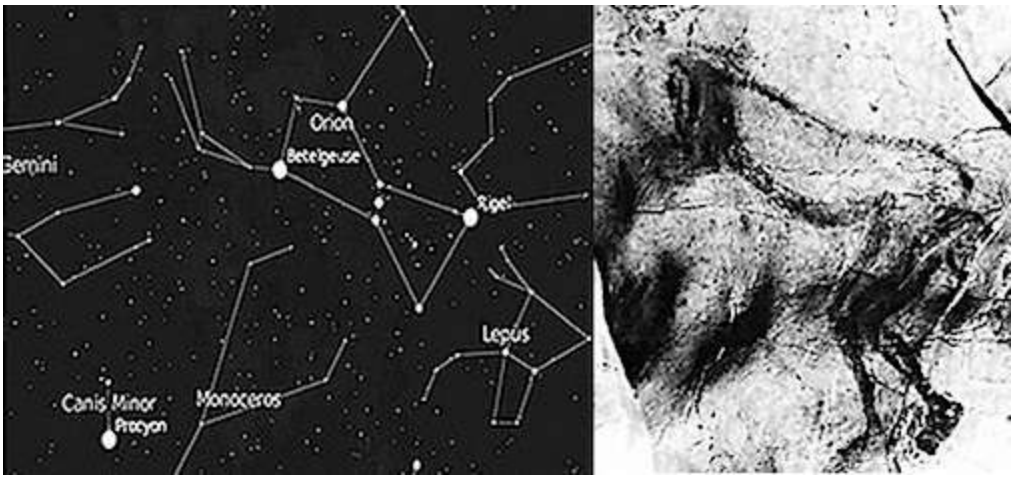
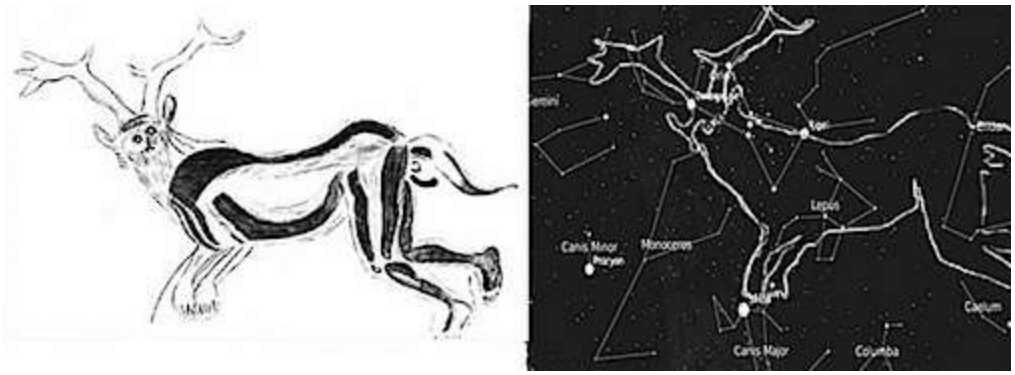


FIGURE. (Upper Right / Lower Left) The "Sorcerer" Trois-Frères cave. (Upper Left / Lower Right) Constellation of Orion/Osiris.



6. THE PLEIADES AND THE CONSTELLATIONS OF TAURUS AND ORION

In the "modern" sky, the constellation of Orisis/Orion the hunter, faces Taurus, the bull; and these starry patterns would not have been profoundly different 20,000 to 30,000 years ago. In ancient Egypt, dating back to the earliest dynasties (Griffiths 1980), Osiris was the god of death and of fertility and rebirth, who wore a a distinctive crown with two horns (later symbolized as ostrich feathers at either side). He was the brother and husband of Isis. According to myth, Orisis was killed by Set (the destroyer) and dismembered. Isis recovered all of his body, except his penis. After his death she becomes pregnant by Orisis. The Kings of Egypt were believed to ascend to heaven to join with Osiris in death and thereby inherit eternal life and

rebirth, symbolized by the star Sirius (Redford 2003). The Egyptian "King list" (The Turin King List) goes backward in time, 30,000 years ago to an age referred to as the "dynasty of gods" which was followed by a "dynasty of demi-gods" and then dynasties of humans (Smith 1872/2005).

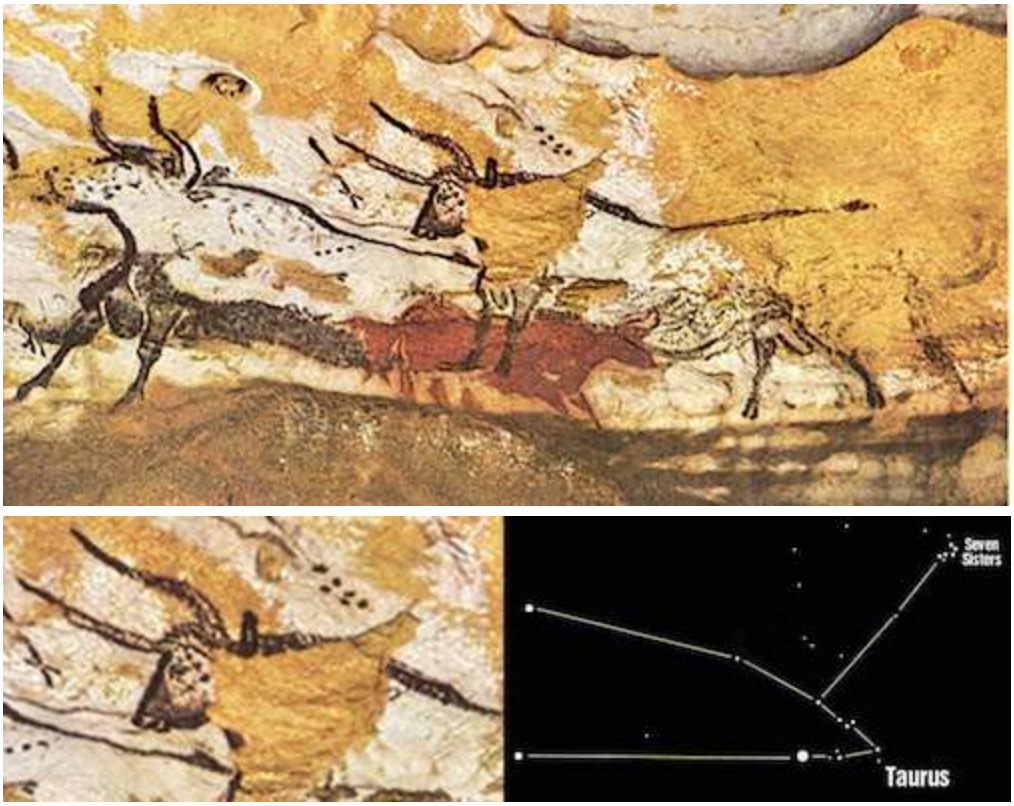
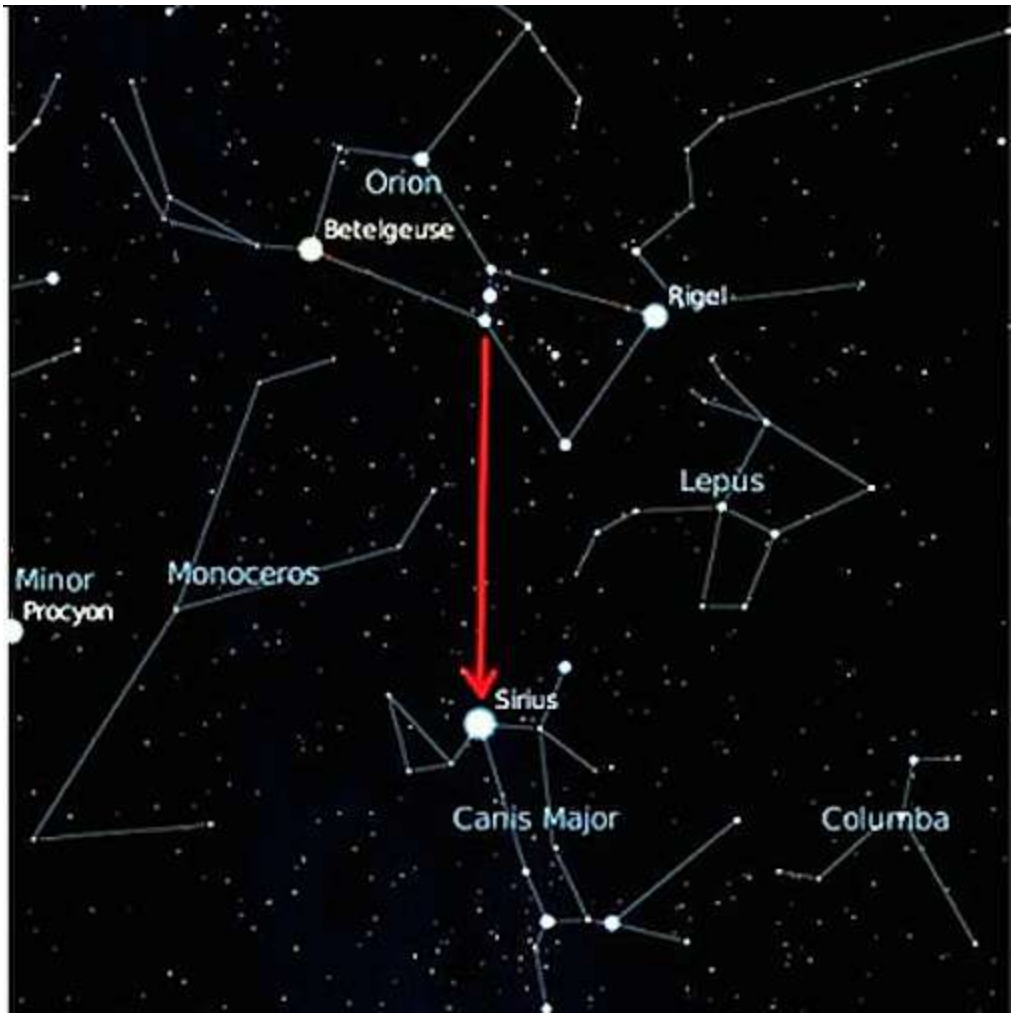


FIGURE: (Top) The main freeze of the bulls in the Lascaux Cave in Dordogne. There is a group of dots on the back of the great bull (Taurus) which may represent six of the seven stars of the Pleiades (the seven sisters). As stars are also in motion, not all would be aligned or as bright or dim today, as was the case 20,000 to 30,000 years ago.

TAURUS
ORION



Over 20,000 years ago, the 6ft tall Cro-Magnon, with their massive brain one third larger than modern humans, painted a hunter with two horns who had been killed. And just as the constellation of Orion the hunter faces Taurus, so too does the dead Cro-Magnon hunter who has dismembered/disembowled the raging bull. And below and beneath the dead Cro-Magnon hunter, another bird, symbol of rebirth, and perhaps symbolizing the star Sirius.

The constellation of Osiris (Orion the hunter) in Egyptian mythology is the god of the dead who was dismembered; but also represents resurrection and eternal life as signified by the star Sirius. (Upper Right) Constellation of Osiris/Orion and Taurus. (Upper Left) Cave painting. Lascaux. The dead

(bird-headed or two horned) hunter killed by a bull whom he disemboweled. (Bottom) Constellation of Orion/Osiris in relation to Sirius.

7. THE PALEOLITHIC AND NEOLITHIC MILKY WAY GALAXY

These peoples of the Paleolithic were capable of experiencing love, fear, and mystical awe, and they believed in spirits and ghosts which dwelled in a heavenly land of dreams. Because they believed souls ascended to the heavens, the people of the Paleolithic searched the heavens for signs. By 30,000 years ago, and with the expansion of the frontal lobes, they created symbolic rituals to help them understand and gain control over the spiritual realms, and created signs and symbols which could generate feelings of awe regardless of time or culture. They observed and symoblically depicted the association between woman and the moon, patterns formed by stars, and the relationship between Earth, the sun, and the four seasons.

The Milky Way galaxy can be viewed in the darkness of night, edge-on, snaking in a curving arc, forming part of a circle. If the peoples of the Paleolithic, through careful observation, deduced the existence of a spiraling galaxy, of which Earth, and the constellations circled round, or which circled round forming a cosmic clock, is unknown.

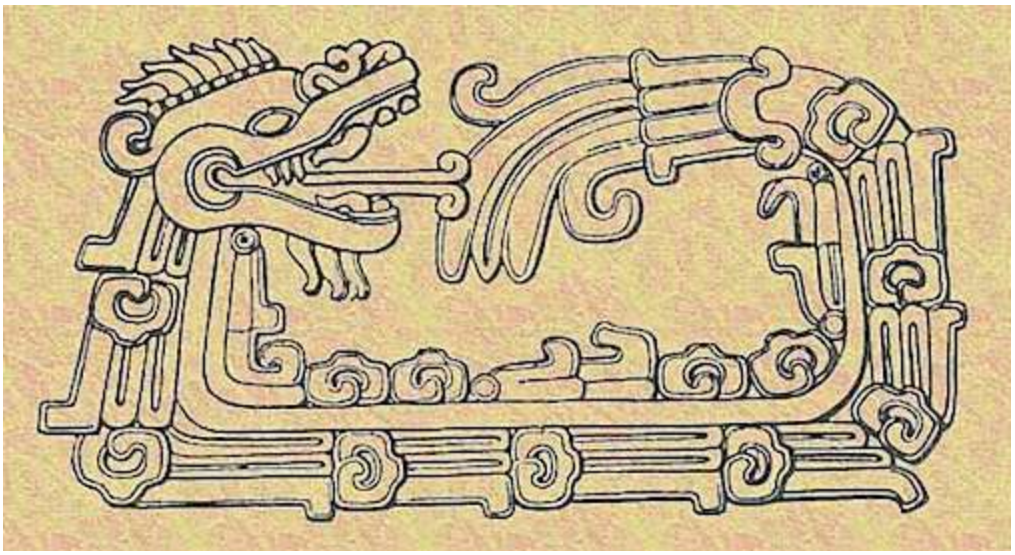


FIGURE: Quetzalcoatl Maya Galaxy

FIGURE: Petroglyph, date unknown.

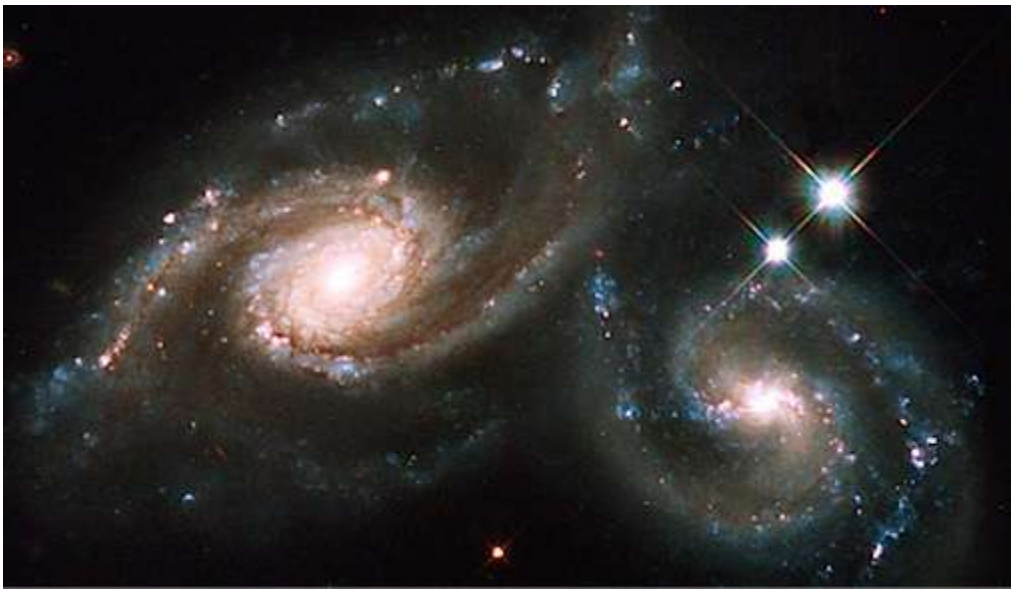


FIGURE: Colliding Galaxies

FIGURE: 12,000 B.C.

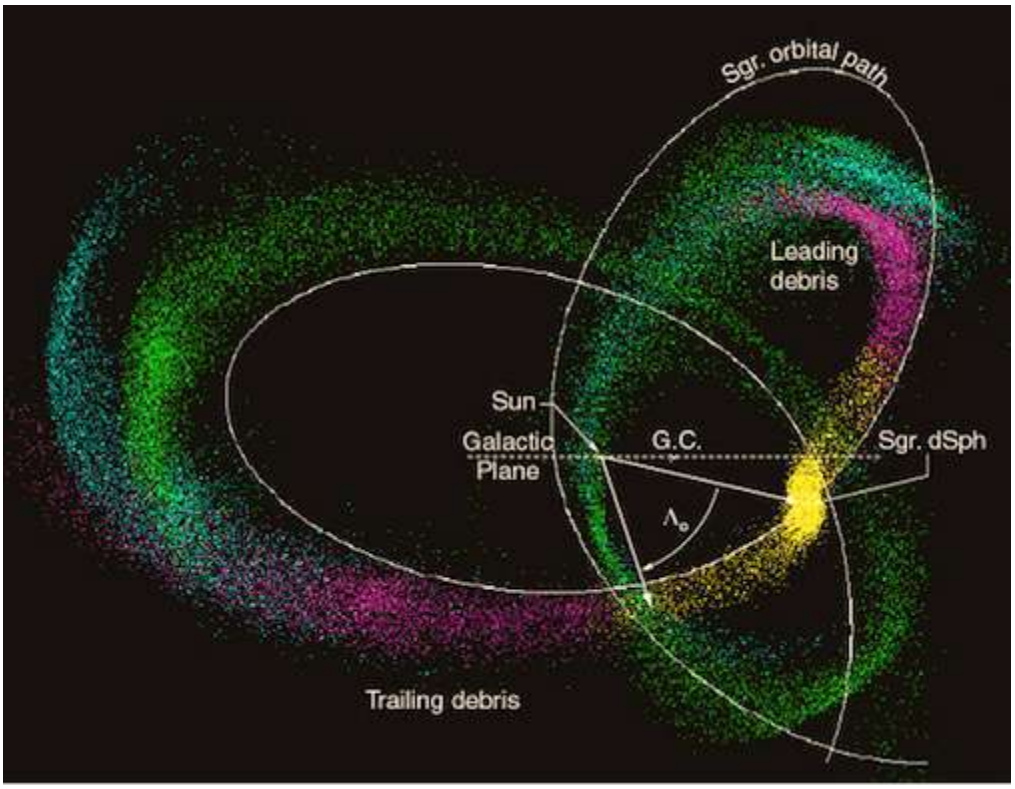


FIGURE: Sagittarius dwarf galaxy orbiting the Milky Way

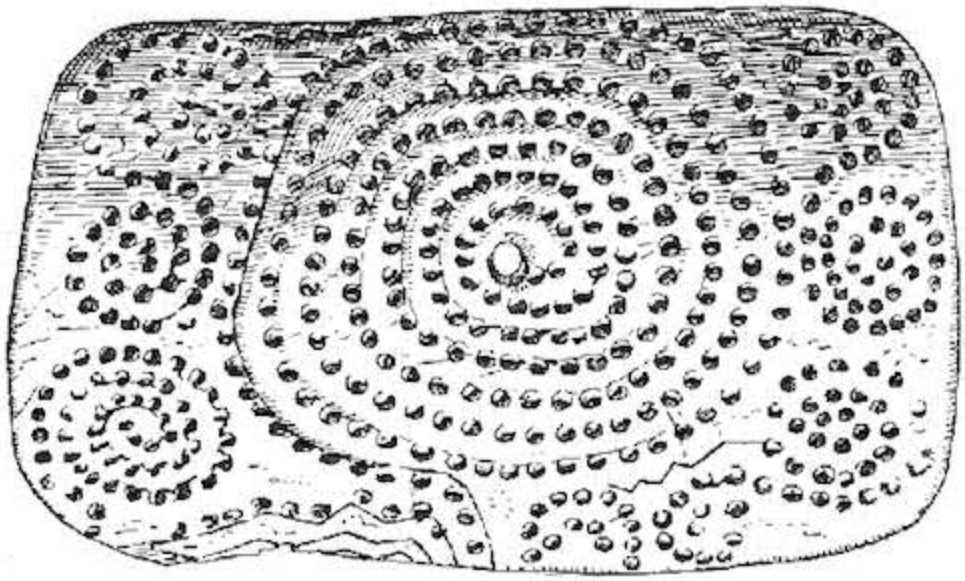


FIGURE: Mal’ta, Irkutskaya Oblast, Russia, 12000-15,000 B.C.

FIGURE: Milky Way Galaxy, viewed from Earth, with some of the constellations depicited. Not position of Orion (Osiris) and Gemini (compare with figure below)

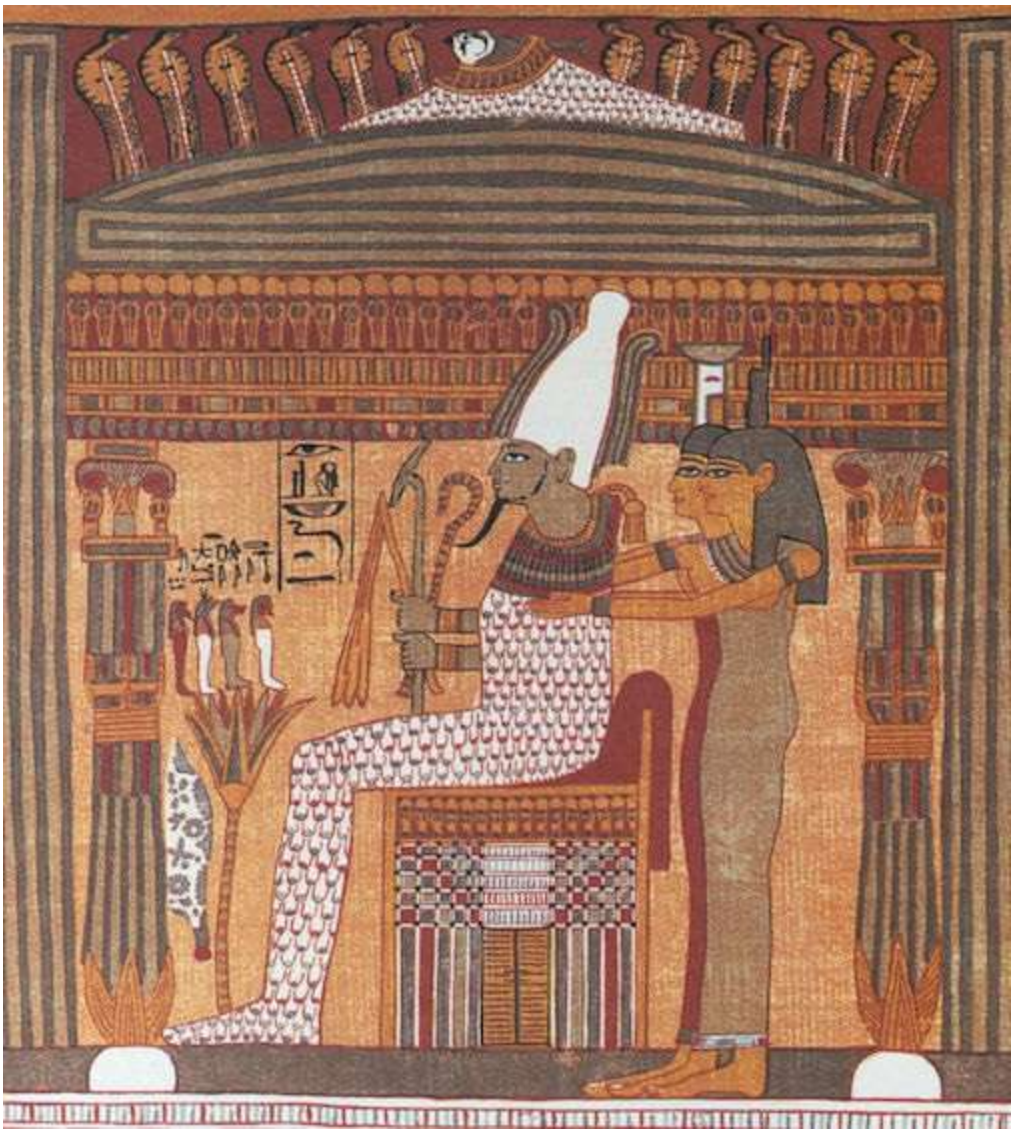


FIGURE: Ancient Eguypt: Osiris atended by the Gemini twins, and above: the Milky Way galaxy, and 12 constellations of the zodiac represented by snakes.

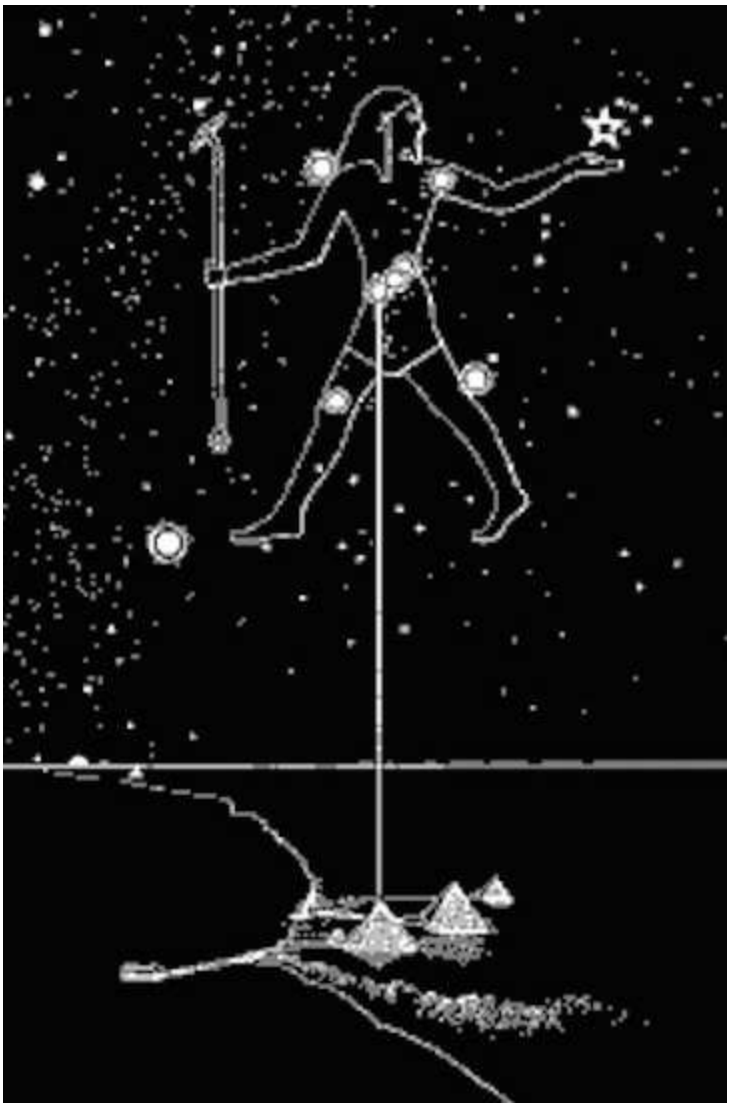


FIGURE: Three belt stars of Osiris (above) Three Pyramids of Giza (below)

References

Akazawa , T & Muhesen, S. (2002). Neanderthal Burials. KW Publications Ltd.

Amaral, D. G., Price, J. L., Pitkanen, A., & Thomas, S. (1992). Anatomical organization of the primate amygdaloid complex. In J. P. Aggleton (Ed.). The Amygdala. (Wiley. New York.

Bandi, H. G. (1961). Art of the Stone Age. New York, Crown PUblishers, New York.

Bear, D. M. (1979). Temporal lobe epilepsy: A sydnrome of sensory-limbic hyperconnexion. Cortex, 15, 357-384.

Belfer-ohen, A., & E.Hovers, (1992). In the eye of the beholder: Mousterian and Natufian burials in the levant. Current Anthropology 33: 463-471.

Breuil. H. (1952). Four hundred centuries of cave art. Montignac.

Budge, W. (1994). The Book of the Dead. New Jersey, Carol.

Butzer, K. (1982). Geomorphology and sediment stratiagraphy, in The Middle Stone Age at Klasies River Mouth in South Africa. Edited by R. Singer and J. Wymer. Chicago: University of Chicago Press.

Binford, L. (1981). Bones: Ancient Men & Modern Myths. Academic Press, NY

Binford, S. R. (1973). Interassemblage variability--the Mousterian and the 'functional' argument. In The explanation of culture change. Models in prehistory. edited by C. Renfrew. Pittsburgh: Pittsburgh U. Press.

Binford S. R. (1982). Rethinking the Middle/Upper Paleolithic transition. Current Anthropology 23: 177-181.

Blikkov, S. M., & Glezer, I. I. (1968). The human brain in figures and tables. New York: Plenum.

Campbell, J. (1988) Historical Atlas of World Mythology. New York, Harper & Row.

Cartwright , R. (2010) The Twenty-four Hour Mind: The Role of Sleep and Dreaming in Our Emotional Lives. Oxford University Press.

Chauvet, J-M., Deschamps, E. B. & Hillaire, C. (1996) Dawn of Art: The Chauvet Cave. H.N. Abrams.

Clark, G. (1967) The stone age hunters. Thames & Hudson.

Clark, J. D., & Harris, J. W. K. (1985). Fire and its role in early hominid lifeways. African Archaeology Review, 3, 3-27.

Conrad, N. J., & Richter, J. (2011). Neanderthal Lifeways, Subsistence and Technology. Springer.

Dennell, R. (1985). European prehistory. London, Academic Press.

Eadie, B. J. (1992). Embraced by the light. California, Gold Leaf Press.

Frazier, J. G. (1950). The golden bough. Macmillan, New York.

Gowlett, J. (1984). Ascent to civlization. New York: Knopf.

Gowlett, J.A. (1981). Early archaeological sites, hominid remains and traces of fire from Chesowanja, Kenya. Nature, 294, 125-129.

Griffiths, J. G. (1980). The Origins of Osiris and His Cult. Brill.

Harold, F. B. (1980). A comparative analysis of Eurasian Palaeolithic burials. World Archaeology 12: 195-211.

Harold, F. B. (1989). Mousterian, Chatelperronian, and Early Aurignacian in Western Europe: Continuity or disconuity?" In P. Mellars & C. B. Stringer (eds). The human revolution: Behavioral and biological perspectives on the origins of modern humans, vol 1.. Edinburgh: Edinburgh University Press.

Harris, M. (1993) Why we became religious and the evolution of the spirit world. In Lehmann, A. C. & Myers, J. E. (Eds) Magic, Witchcraft, and Religion. Mountain View: Mayfield.

Harvati, K., & Harrison, T. (2010). Neanderthals Revisited. Springer.

Hayden, B. (1993). The cultural capacities of Neandertals: A review and re-evaluation. Journal of Human Evolution 24: 113-146.

Holloway, R. L. (1988) Brain. In: Tattersall, I., Delson, E., Van Couvering, J. (Eds.) Encyclopedia of human evolution and prehistory. New York: Garland.

Joseph, R. (1990b) The frontal lobes. In A. E. Puente and C. R. Reynolds (series editors). Critical Issues in Neuropsychology. Neuropsychology, Neuropsychiatry, Behavioral Neurology. Plenum, New York.

Joseph, R. (1992) The Limbic System: Emotion, Laterality, and Unconscious Mind. The Psychoanalytic Review, 79, 405-456.

Joseph, R. (1993) The Naked Neuron. Evolution and the languages of the body and the brain. Plenum. New York.

Joseph, R. (1994) The limbic system and the foundations of emotional experience. In V. S. Ramachandran (Ed). Encyclopedia of Human Behavior. San Diego, Academic Press.

Joseph, R. (1996). Neuropsychiatry, Neuropsychology, Clinical Neuroscience, 2nd Edition. 21 chapters, 864 pages. Williams & Wilkins, Baltimore.

Joseph, R. (1998a). The limbic system. In H.S. Friedman (ed.), Encyclopedia of Human health, Academic Press. San Diego.

Joseph, R. (2001). The Limbic System and the Soul: Evolution and the Neuroanatomy of Religious Experience. Zygon, the Journal of Religion & Science, 36, 105-136.

Joseph, R. (2002). NeuroTheology: Brain, Science, Spirituality, Religious Experience. University Press.

Joseph, R. (2011a). Dreams and Hallucinations: Lifting the Veil to Multiple Perceptual Realities, Cosmology, 14, In press.

Joseph, R. (2011). The neuroanatomy of free will: Loss of will, against the will "alien hand", Journal of Cosmology, 14, In press.

Jung, C. G. (1945). On the nature of dreams. (Translated by R.F.C. Hull.), The collected works of C. G. Jung, (pp.473-507). Princeton: Princeton University Press.

Jung, C. G. (1964). Man and his symbols. New York: Dell.

Kawashima, R., Sugiura, M., Kato, T., et al., (1999). The human amygdala plays an important role in gaze monitoring. Brain, 122, 779-783.

Kling. A. S. & Brothers, L. A. (1992). The amygdala and social behavior. In J. P. Aggleton (Ed.). The Amygdala. New York, Wiley-Liss.

Kurten, B. (1976). The cave bear story. New York: Columbia University Press.

Leroi-Gourhan, A. (1964.) Treasure of prehistoric art. New York: H. N. Abrams.

Leroi-Gourhan, A. (1982). The archaeology of Lascauz Cave. Scientific American 24: 104-112.

MacLean, P. (1990). The Evolution of the Triune Brain. New York, Plenum.

Malinowski, B. (1954) Magic, Science and Religion. New York. Doubleday.

McCown, T. (1937). Mugharet es-Skhul: Description and excavation, in The stone age of Mount Carmel. Edited by D. A. E. Garrod and D. Bate. Oxford: Clarendon Press.

Mellars, P. (1989). Major issues in the emergence of modern humans. Current Anthropology 30: 349-385.

Mellars, P. (1996) The Neanderthal legacy. Princeton University Press.

Mellars, P. (1998). The fate of the Neanderthals. Nature 395, 539-540.

Morris, J. S., Frith, C. D., Perett, D. I., Rowland, D., Young, A. W., Calder, A. J., & Colan, R. J. (1996). A differential neural response in the human amygdala to fearful and happy facial expression. Nature, 383, 812-815.

Petrides, M., & Pandya, D. N. (1999). Dorsolateral prefrontal cortex:

comparative cytoarchitectonic analysis in the human and the macaque brain and corticocortical connection patterns. European Journal of Neuroscience 11.1011–1036.

Petrides, M., & Pandya, D. N. (2001). Comparative cytoarchitectonic analysis of the human and the macaque ventrolateral prefrontal cortex and corticocortical connection patterns in the monkey. European Journal of Neuroscience 16.291–310.

Prideaux, T. (1973). Cro-Magnon. New York: Time-Life.

Redford, D. B. (2003). The Oxford Guide: Essential Guide to Egyptian Mythology, Berkley.

Rightmire, G. P. (1984). Homo sapiens in Sub-Saharan Africa, In F. H. Smith and F. Spencer (eds). The origins of modern humans: A world survey of the fossil evidence. New York: Alan R. Liss.

Roginskii Y. Y., & Lewin S. S. (1955). Fundamentals of Anthropology. Moscow: Moscow University Press.

Schwarcz, A. et al. (1988). ESR dates for the hominid burial site of Qafzeh. Journal of Human Evolution 17: 733-737.

Smirnov, Y. A. (1989). On the evidence for Neandertal burial. Current Anthropology 30: 324.

Smith, G. A. (1872/2005). Chaldean Account of Genesis (Whittingham & Wilkins, London, 1872). Adamant Media Corporation (2005).

Solecki, R. (1971). Shanidar: The first flower people. New York: Knopf.

Subirana, A., & Oller-Daurelia, L. (1953). The seizures with a feeling of paradisiacal happiness as the onset of certain temporal symptomatic epilepsies. Congres Neurologique International. Lisbonne, 4, 246-250.

Tilney, F. (1928). The brain from ape to man. New York: P. B. Hoeber.

Tobias, P. V. (1971). The Brain in Hominid Evolution. Columbia University Press, New York.

Trinkaus, E. (1986). The Neanderthals and modern human origins. Annual Review of Anthropology 15: 193-211.

Weingarten, S. M., Cherlow, D. G. & Holmgren. E. (1977). The relationship of hallucinations to depth structures of the temporal lobe. Acta Neurochirugica 24: 199-216.

Williams, D. (1956). The structure of emotions reflected in epileptic experiences. Brain, 79, 29-67.

Wilson, J. A. (1951) The culture of ancient Egypt. Chicago, U. Chicago

Press.
Wolpoff, M. H. (1980), Paleo-Anthropology. New York, Knopf.

******

****

******

II: NEUROLOGY OF COSMIC CONSCIOUSNESS: DREAMS, DEATH, STARS AND SOULS

******

****

******

4. A Neuro-Cosmology of Death, Souls, Spirits, Rebirth, Astral Projection, Judgment Day, Hell, and the Second Death

Joseph Gabriel

The sun was born about 4.6 billion years ago. It has enough nuclear fuel to last for another 5 billion years. Then it will grow to become a type of star called a red giant. Later in the sun's life, it will cast off its outer layers. The remaining core will collapse to become an object called a white dwarf, and will slowly fade. The sun will enter its final phase as a faint, cool object sometimes called a black dwarf.

FIGURE: Mayan Sun God

FATHER SUN GOD

For much of humanity's history, the sun has been worshipped as a life-giving god which rules the heavens and our solar system. Many a king and

queen have claimed to be direct descendants of this all powerful solar deity, the bringer of life.

FIGURE: Hindu

FIGURE: Egyptian

Ancient peoples and civilizations the world over, from Egypt to the Incas of Peru, erected massive stone temples and monuments which faced the rising sun on the morning of the equinox and rebirth, the first day of Spring, . They held great religious ceremonies to celebrate the celestial cross: the Winter-Summer Solstice and the Spring-Autumn equinox; the four corner of Earth and the cosmos: which were believed to have cosmic significance.

The equinox means equality, for the day and the nights are of equal length on these ancient Holy days. Rising in a different constellation every 2160

years, it is the sun's changing position on the morning of the equinox, over thousands of years of time, which the ancients believed heralded a new age and the death and birth of the gods. Thus for the last 2160 years the sun had risen in the houses of Pieces and Virgo during the Spring and Fall Equinox, which is why the Christian god, Jesus, is linked to Virgo, the virgin, and Pieces the two fish. And before Jesus the Pieces there was the god of the Ram, and before the Ram, Taurus the Bull; a new god and a new age every 2160 years, marked by the rising sun in a different constellation on the day of the equinox. And each new god proclaims: thou shalt honor no gods before me.

It is during the equinox that the sun most brilliantly lights up the Earth with dazzling, incredibly bright, multi-colored sheets of light, known as the polar auroras. For millinnea those living in the far northern or southern latitudes have been dazzled by these unearthly solar displays, called the "aurora borealis" in the north, in honor of Aurora, the Roman goddess of the Dawn, and Boreas the Greek god of the wind. In the southern latitudes these ghostly displays of brilliantly colored wavering lights are called the aurora "australis" which is Latin for "south."

The auroras become most beautiful and colorful during the Equinox. Ancient peoples believed these were dancing spirits or the shadows of the gods. In fact, these great shows of light are caused by solar winds as they slam into the Earth's protective magnetic field and the upper atmosphere. The magnetic field is produced by electrical currents generated by the Earth's spinning molten iron core, and extends thousands of miles into space, creating a magnetosphere. The solar wind, consisting of charged plasma particles emitted by the sun, collides with the charged particles of the Earth's magnetosphere, electrically exciting and interacting with oxygen and nitrogen gasses and ions, creating a rainbow of shimmering greens, reds, purples and blues. For reasons that are not well understood, the solar wind increases in strength and velocity during the equinox, causing massive geomagnetic storms and extraordinarily colorful auroras; though this is not always the case.

From August 28 through September 2, 1859 the Earth was battered by a great magnetic storm triggered by powerful solar winds, solar flares and coronal eruptions from the sun. For five days the planet was enveloped in ghostly shimmering sheets of greens, reds, and blues which were so

brilliantly bright that night became day and even the darkest shadows of evening were illuminated with dazzling lights. The ancients also witnessed such incredible sights, which they believed were directly related to the sun god and the spirits and souls of the dead; and those yet to be reborn.

THE DEATH OF FATHER SUN

The last breaths of a dying star are exhaled as titanic, planet shaking, solar winds that grow more powerful and destructive with each dying day. When our own sun begins to die perhaps 6 billion years from now, its solar winds will roll across the Earth like a cosmic tsunami and the night skies will be illuminated for a millennia with fires of light. However, our sun is too small to erupt in a giant supernova, but instead will shrink, then grow, then shrink smaller still until it collapses, implodes and becomes an extremely dense and coldly pale "white dwarf."

However, once our sun begins to die, and well before its final collapse, all intelligent Earthly life will suffocate and drop to the ground gasping for breath. Increasingly powerful solar winds will whip our planet with cosmic hurricane gale force and strip the planet of its atmosphere. The oceans and seas will boil away, and the Earth's atmosphere, heavy with dust and watery mist, will be ripped from its moorings and blown into the black void of deep space. The air literally sucked from their lungs, all animals will collapse, gasping for breath, and die.

DEATH AND REBIRTH OF THE SUN GODS

Life gives birth to life, and stars give birth to stars in an endless cycle of death and rebirth. It's a cosmic dance which may have been ongoing for all eternity. Birth and death are part of the cycle of life. Some stars give birth as they die; becoming red giants and exploding in a vast supernova, spawning hundreds of infant proto-stars.

The ancient sun god, and the stars in the heavens above, die, but give birth to hundreds of new stars, new suns; suns of the sun gods.

Ancient peoples throughout the world worshipped the sun for its life generating powers, believing it a god which governed the cosmic cycle of death and rebirth. In ancient Egypt the morning sun represented rebirth and the god Horus the divine son of Isis and Osiris. The afternoon sun was the

God Re, the most powerful of the gods because of his great strength. The redness of the setting sun was the blood of the god as he died. It was the evening sun Atum, the creator god who transported the dead pharoahs to the heavens where they were resurrected and brought back to life to live among the stars which were gods.

The sun also died and was reborn, or so believed the ancients, with death and rebirth taking place during a 3 day period beginning on the Winter Solstice, December 22. "Solstice" means, "Sun standing still" and during the Winter Solstice the sun seems to stop its southerly journey toward the underworld, and then to reverse course, ascending northward into the heavens on December 25--the birthday of innumerable gods and sons of gods. Thus, many ancient cultures celebrated the birth and resurrection of the sun on December 25.

Every son has a father. The ancient Aryans believed the sun was the "son" of the Sky God, and was thus the "Son of the sky" and had been created and fathered by the Heavenly Father who in turn had been sired by Father Sun. The son of the Sun-God becomes God the Sun. Christians borrowing from the ancient pagans, believed Jesus to be the "son of god" and "god the son" the incarnation of the Heavenly father, and who dies and is resurrected, ascending to heaven, becoming one with god.

Thus ancient peoples throughout the world believed the "Son of the Sun-God" was sired by God the Sun, becoming the Sun God who sets and dies and ascends to heaven, is resurrected and reborn to become the Heavenly Father, the Sun, in an endless cycle of death and rebirth, thus guaranteeing eternal life to all god's children--so claim the ancients.

The ancient were also aware that at death, or after death, the spirit or soul of the dear departed may also rise toward the heavens. Sometimes those who died return to life to tell the tale. Some children and adults who have been declared "clinically" dead but who subsequently return to life, have reported that after "dying" they left their body and floated above the scene (Eadie 1992; Joseph, 1996, 2011; Rawling 1978; Ring 1980). Typically they become increasingly euphoric as they float above their body, after which they may float away, become enveloped in a dark tunnel and then enter a soothing radiant light. And later, when they come back to life, they may even claim conscious knowledge of what occurred around their body while they were dead and floating nearby. Similar experiences are detailed in the Egyptian

funery texts and “book of the dead,” written almost 6000 years ago (Budge 1994) as well as the Tibetan Book of the Dead (the Bardo Thodol) which was composed over 1,300 years ago. Approximately 37% of patients who are resuscitated report similar “out of body” experiences (Ring 1980). . Thus, it was known, even thousands of years ago, that those who die, may return to life; or they may be embraced by the light and join the heavenly father; and thus, live again, as a spirit basking in the light of the life giving god.

It is these beliefs, the experience of death, rebirth, be it the sun or those beloved on Earth, which contributed to the development of the first cosmologies as is evident among the ancient Egyptians, the Ayrians of ancient India, as well as Babylon and the ancient Mayans and Incas.

EGYPTIAN SOUL COSMOLOGY

In Egypt, the concept of the soul, as gleaned from a reading of the Book of the Dead, is divided into various forms which are necessarily entirely distinct. Nevertheless the ren is an individual’s name, the sheut their shadow and the ib the heart. However, while ka is often translated as spirit, it is the ba which is normally considered to most closely resemble ‘soul’ (Frankfort 1978, p. 61). Whereas the ka, as a universal life-force, leaves the body at death, it is the ba which possesses some chance of transcendental immortality and which enables travel between the earth and the sky after death.

Ancient kings and queens, those or royal blood, claimed, as their ancestral heritage to be descended from the gods--and the ultimate god is the Sun. Thus, at death the ba of the kind and queen would ascend to heaven--but the common people believed they too had souls and upon death their immortal soul would journey to a celestial afterlife; either to join father sun, the sun god, or to take a place among the children and brothers and sisters of the god: the stars which became gods in their own right. Thus, upon death, the soul would travel to the stars; and thus, the ancient sought to study the heavens to understand the gods; and to ensure that they would jouney to the heavens, and not to the other place, later known as hell.

The Pyramid Texts, which first occur in the fifth dynasty pyramids, indicate that the king mounted to heaven on the rays of the sun. For example, Pyramid Text Utterance 508 reads ‘I have trodden those thy rays as a ramp under my feet whereon I mount up to that my mother, the living Uraeus on the brow of Re’ and Utterance 523 tells us that ‘May the sky make the

sunlight strong for you, may you rise up to the sky as the Eye of Re' (Faulkner 1993).

The ascent to heaven was associated with the cosmology of Heliopolis; a counterpart to Osiris' dominion over the dead (Morenz 1992, pp. 205, 207, 211): the ba will 'view the sun and move freely among the 'lords of eternity' (Baines 1991, p. 190). The ba of the god Amon was in heaven, while his body in the realm of the dead and his image in the temple, and heaven was raised high for the ba of Osiris (Morenz 1992 pp. 151, 208). The pyramid texts talk of the double-doors of heaven opening, and Nut instructs the king to 'open up your place in the sky among the stars of the sky, for you are the Lone star' (Morenz, 1991, p. 205). The ba of the God and the ba of the king both belonged in the sky. But there was also a descent: the ba of the god may descend from heaven and enter its image (Morenz 1992, p. 115). The dead may live again.

"Go aboard this boat of Ra to which the gods desire to draw near, aboard which the gods desire to go, in which Ra rows to the horizon..... Raise yourself, O my father Osiris the King, for you are alive!" -Pyramid Texts 667

"O Shining One (Ra)! O Shining One! O Khepera! O Khepera! You are for the King and the King is for you; you live for the King and the King lives for you." -Pyramid Texts 662

JUDGEMENT AFTER DEATH

It is commonly believed that some souls will go to heaven, and others would spend eternity in hell. The determination of which soul would go where, thus gave rise to the concept of being judged. The nature of one's afterlife depended on how one was judged and the nature of one's good and evil deeds. Death, therefore, also became a final judgment day where the wicked were punished, and the good rewarded with eternal heavenly bliss.The ancient Sumerians, Babylonians, and Egyptians, as well as the ancient peoples of the Indus valley, and ancient China clearly believed that a final judgment awaited man after death.

For example, in the Rig-Veda we are told that the good are invited to live in heaven, whereas the wicked are hurled by the deities Soma and Indra into an eternally dark prison from whence there is no return.

According to the ancient Egyptians, the woman and man who respected

and maintained maat— that is, truth, justice, and righteousness—would achieve a state of eternal beatitude, whereas those who did not could expect to suffer in a dreary Hellish underworld where they and the enemies of the sun god Ra would burn for all eternity—roasted by the burning rays of the sun. Most of these ideas were laid out in considerable detail in the Egyptian Book of the Dead, the Pyramid Texts.

The Pyramid Texts were composed and compiled by the priests of Heliopolis, to help the dead pharaohs achieve eternal bliss in the afterlife. Only the morally just could expect to enter heaven and become a star. Nevertheless, the dead, both good and evil, would have to defend themselves against every accusation. Life in the afterworld could be easily imperiled by accusations of those who had been wronged.

Yet, in ancient Egypt, it was believed that the chief accuser would be memory, the dead's own memories, and the dead's own heart would recount and remember their good or evil deeds. Indeed, it would be hell to be plagued for all eternity by every bad memory and all associated feelings of guilt and psychic pain.

This same belief is recounted in the Tibetan Book of the Dead: "You are now before Yama, King of the Dead. The mirror in which Yama seems to read your past is your own memory, and also his judgment is your own. It is you yourself who pronounces your own judgment, which in turn determines your rebirth."

However, whereas the Tibetan Buddhists believed that the souls of the dead passed judgment on themselves, the ancient Egyptians believed that the Great God Osiris would pass judgment. Osiris, would hold and weigh the scales of justice.

JUDGMENT

The Great God of the ancient Egyptians did not pass judgment alone, for in this he was assisted by a council of 12, a tribunal of the Great God. As detailed in the Book of the Dead, the jackal-headed god of death, Anubis, adjusts the scales of justice which will determine one's fate; to his right stands Thoth, the ibis-headed god of wisdom—the divine scribe who records the final verdict. And behind Osiris crouches a horrible hybrid monster, the eater of the dead.

"The council which judges the deficient, thou knowest that they are not

lenient on the day of judging the miserable, the hour of doing their duty. It is woe when the accuser is one of knowledge. Do not trust in length of years, for they regard a lifetime as but an hour. A man remains after death, and his deeds are placed beside him in heaps. However, existence yonder is for eternity, and he who complains of it is a fool. But as for him who reaches it without wrong-doing, he shall exist yonder like a god, stepping out freely like the lords of eternity." -Egyptian Book of the Dead.

Not only is it futile for the guilty to proclaim their innocence, but the consequences, the manner in which the balance sways depends on one's own heart and memories, which will testify against the dead. According to the ancient Egyptians, the heart will be laid upon the scales and weighed against the lightness of a feather and balanced against Maat; Maat being truth. Good outweighs the evil, salvation would be at hand, for it could be expected that "the offenses of which thou art accused will be eliminated, thy fault wiped out by the balancing of the balance, in the day of the evaluation of qualities; thou causes the weighing to be made as Thoth." -Egyptian Book of the Dead.

THE SECOND DEATH

In later Vedic literature, including the Brahmanas, we are told of a second death. All souls would suffer a penalty that would be paid in the form of dying again and again, possibly for all eternity. This is called samsara, the transmigration of the soul. Thus according to the ancient peoples of the Indus Valley, after one dies, they could suffer a second death, and then a third death, and so on, for all eternity, each subsequent life determined by one's character and behavior in previous lives.

Although the Greeks thought it possible to achieve a state of blessed eternal beatitude, they also believed that some souls fall from their primal state of beatitude and undergo a series of incarnations, beginning in insect or bestial form, and that they then have to live and die ten thousand deaths before regaining a human state. Only enlightened souls can escape this endless cycle of birth and death.

According to modern Christian faiths, the dead also suffer a second death, which may be more horrible than the first. That is, after the soul awakens from purgatory: "The Son of man will send his angels, and they will gather out of his kingdom all causes of sin and all evildoers, and throw them into the furnace of fire; there men will weep and gnash their teeth. Then the righteous

will shine like the sun in the kingdom of their father." -R.S.V. 13:41-43.

"Do you not know that the unrighteous will not inherit the kingdom of God? Do not be deceived; neither the immoral, nor idolaters, no adulterers, nor homosexuals, nor thieves, nor the greedy, nor drunkards, nor revivlers, nor robbers, will inherit the kingdom of God."-Paul, Galatians, V 22-23.

"The cowardly, the faithless, the polluted, murderers, fornicators, sorcerers, idolaters, and all liars, their lot shall be the lake that burns with fire and brimstone, which is the second death." -Revelation of St. John, II:184, 4356-457.

However, it was also believed possible to escape the second death if one had lived a life free of sin, or if one repented for their sinful ways. And this same belief is held by those of the Hindu and Buddhist faith. That is, if the consequences of one's Karma could be worked out by the self, the Atman before the next reincarnation, the soul would not have to be born again only to die again and yet again. As to those who failed to work out the consequences of their Karma, or those who had lived a life of the utmost evil, their lot would become an eternal hell.

THE PYRAMIDS: HEAVEN ON EARTH

The great pyramid was said by ancient Arabic historians to contain the world's knowledge, wisdom, and the secrets of the cosmos and creation. The base of the Great Pyramid covers 13 acres (5 hectares), and reaches a height of 480 feet (145 meters). The Great Pyramid consists of 2,300,000 stones, each weighing 21/2 tons, measuring 50 by 50 by 28 inches. It has five sides and five corners and a "pyramid inch" is one-fifth of one-fifth of a cubit--what Sir Isaac Newton called sacred and profane cubits. The north side is 755.4 feet long, the west 755.8, the east 755.9, and the south side was 756.1 feet long, indicating an incredible degree of engineering precision that was, in total no more than half a foot off from perfection. Indeed, as the Earth has shook and moved over the eons, the pyramid may well have shifted every so slightly, such that originally all sides were precisely the same. Moreover, not just the Great Pyramid, but the sides of all three of the Pyramids of Giza are perfectly aligned to the cardinal points of the compass.

The area of the Great Pyramid's base divided by twice its height gives the figure 3.14159+, (pi). Pi is the constant that is multiplied by the diameter of a circle to give its circumferences. Indeed, the Great Pyramids was built in

accordance with geometrical and astronomical laws to record the dimensions of the earth and the duration of the solar year.

The builders of the pyramid were well versed in astronomy and knew the relationship of the radius to its circumference. They knew the circumference of the Earth, and the distance of the center of the Earth to the poles. The ratio of the Great Pyramid's altitude to its perimeter is the same as that of the polar radius of the Earth to its circumference: 2 pi. Hence, the Great Pyramid could be used to record the movements of the stars around the heavens in relation to the earth.

In fact, as determined by Charles Piazzi Smyth, the Astronomer-Royal of Scotland, the Great Pyramid incorporates and reveals the distance of the earth from the sun when its height is multiplied by the proportion of its height to its width, that is, ten to the ninth power.

The builders of the Great Pyramid "had determined the shape of the earth which they knew to be a true circle, its size, its precise circumference, the geographical distance from the equator to the poles, the fact that the earth is flattened at the poles, degrees of latitude and longitude to within a few hundred feet, the fact that they were shorter at the equator and longer at the poles, and the exact distance of the Earth from the sun. They had designed the pyramid's base to correspond to the distance the earth rotates in half a second" (Funrneaux, 1987, p 17).

Werner von Siemens, founder of Siemens' Electric, scaled the summit of the Great Pyramid in 1859, and stuck his finger up into the air. As he assumed a triumphant pose, a crack of electricity rang out

The three great pyramids were a cosmological map of heaven on Earth.

The kings of ancient Eygpt wished to avoid the second death and to ensure they would join their place among the stars which are gods. The three great pyramids of Egypt were created to serve as the pharaoh's gateway to the stars. ..The Egyptians developed the first cosmologies--and they were based on death and belief in the afterlife, and developed to ensure that one would take their rightful place among the stars, and not go to hell.

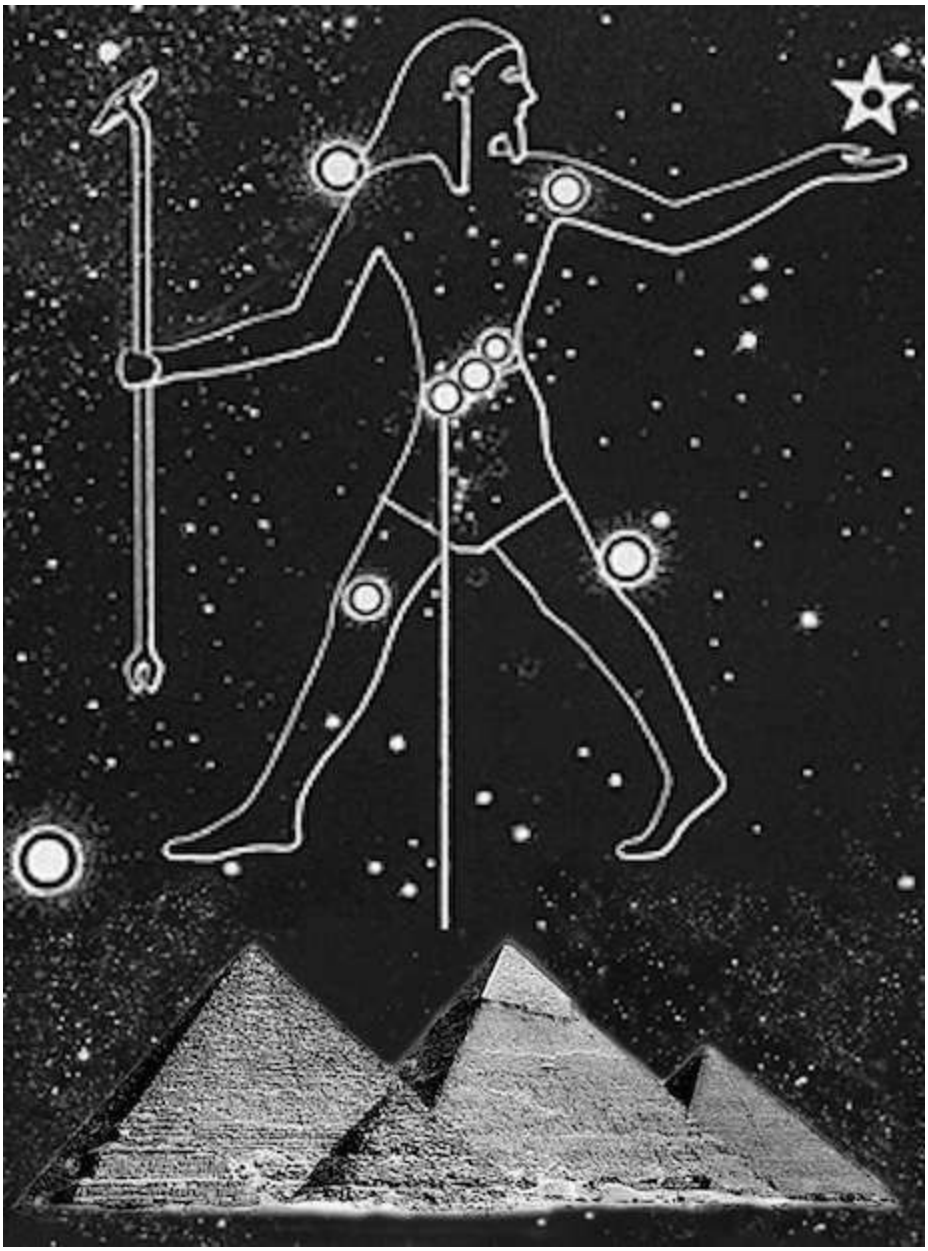
The three bright stars forming the belt of Orion ,the hunter, were the celestial embodiment of Osiris, the Egyptian god of the dead. Orion was of dual importance to Egyptians. The constellation was believed to be the final resting place of pharaohs, where they joined forever with the gods of the sky.

Orion also appeared in the night sky shortly before Sirius, which in turn

heralded the arrival of the life-giving summer floods. Sirius represented Isis, Osiris' sister and consort, who trailed him across the sky.

Osiris symbolized the birth, growth, death, and rebirth of the natural world. In Egyptian mythology, Osiris was murdered and dismembered by his jealous brother, Seth, then briefly brought back to life by his sister and consort Isis to father the god Horus. Egyptians saw Osiris in the constellation Orion, whose appearance was connected with the annual flood. As god of the dead, Osiris welcomed the recently deceased to their new world.

Whoever constructed the three great pyramids, ensured they would be oriented in size and magnitude to mirror the three belt stars of Orion And who ever built the great pyramid, had a shaft constru cted in his burial chamber pointing directly to Orion, which was considered to be the final resting place of the pharaohs.



The Egyptian Star Religion and Rebirth

The Egyptians practiced a solar religion, centering on the worship of Ra and Heliopolis, the City of the Sun and Osiris, the King of the Dead. The stars were of the utmost importance as the destination of the King after dearth: The dead kings, and ordinary people later, joined with or even bacme one with the god Osiris after their death. This god had a stellar representation, the constellation of Orion.

There are four strange and small shafts (20 x 20 cm wide) in the Great Pyramid. Both upper chambers have two of them, one going south and one

north. All four shafts rise at angles between 36 and 45 degrees. The shafts of the upper King's chamber were each open at both ends, the shafts of the lower Queen's chamber were each closed at both ends. Presumably, the soul could travel through the northern shaft to the imperishable stars in the North. The southern shaft of the King's chamber points to Orion. Presumably, at the time the pyramid was built, the shaft pointed exactly to the star the Great Pyramid represents in Orion's belt. Likewise, the southern shaft of the Queen's Chamber at one time pointed at the brightest star in the sky, Sirius, who is the representation of Isis, who was the sister and great love of Osiris.

The Pharoahs regarded themselves as the embodiment of Osiris on Earth and when they died they believed they would travel up to the Duat and be reborn in the afterlife.

The pyramids, therefore, were not just tombs for the pharaohs, but vehicles to facilitate the pharaoh's travel to the afterlife through the Duatt, and Osiris was represented in the Duat by Orion.

"O Great One of Atum (another attribute of Khepera, the creator), son of a great one of Atum, the King is a Star in the sky among the gods."-Pyramid Texts 586A

"O King, you are this great star, the companion of Orion, who traverses the sky with Orion, who navigates the Duat with Osiris; you ascend from the East of the sky, being renewed at your due season....." -Pyramid Texts 466

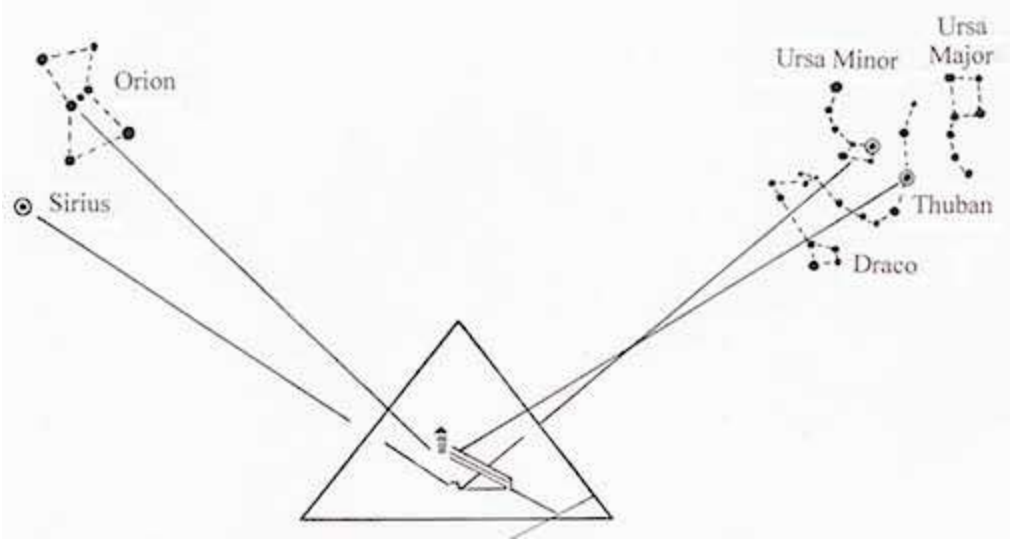
From the moment of the king's birth he was groomed and trained for his return to the First Time. All his life, every aspect of it, was associated with his journey. He was taught spells and incantations to secure a safe passage to the stars after death, which he recited from the Book of the Dead and the Pyramid Texts. His sole aim in life was his successful return to the First Time, and the pyramids, were the starting point of this greatest of journeys to the stars.

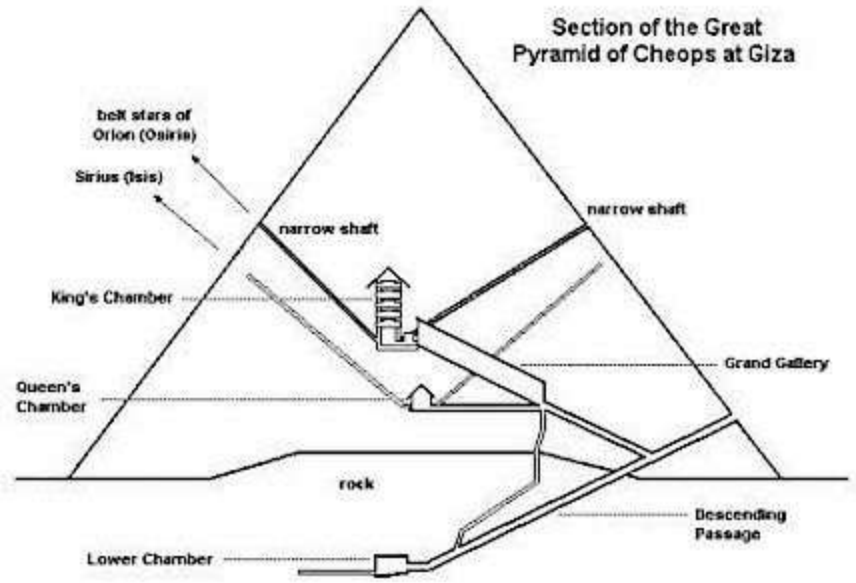
The chain of command in Egypt was unbroken -each King, though a living, breathing being, was a renewal of the covenant which the gods made with man. The dead King, though dead to this world, lived on in spirit as he made his way back to the beginning, to the First Time.

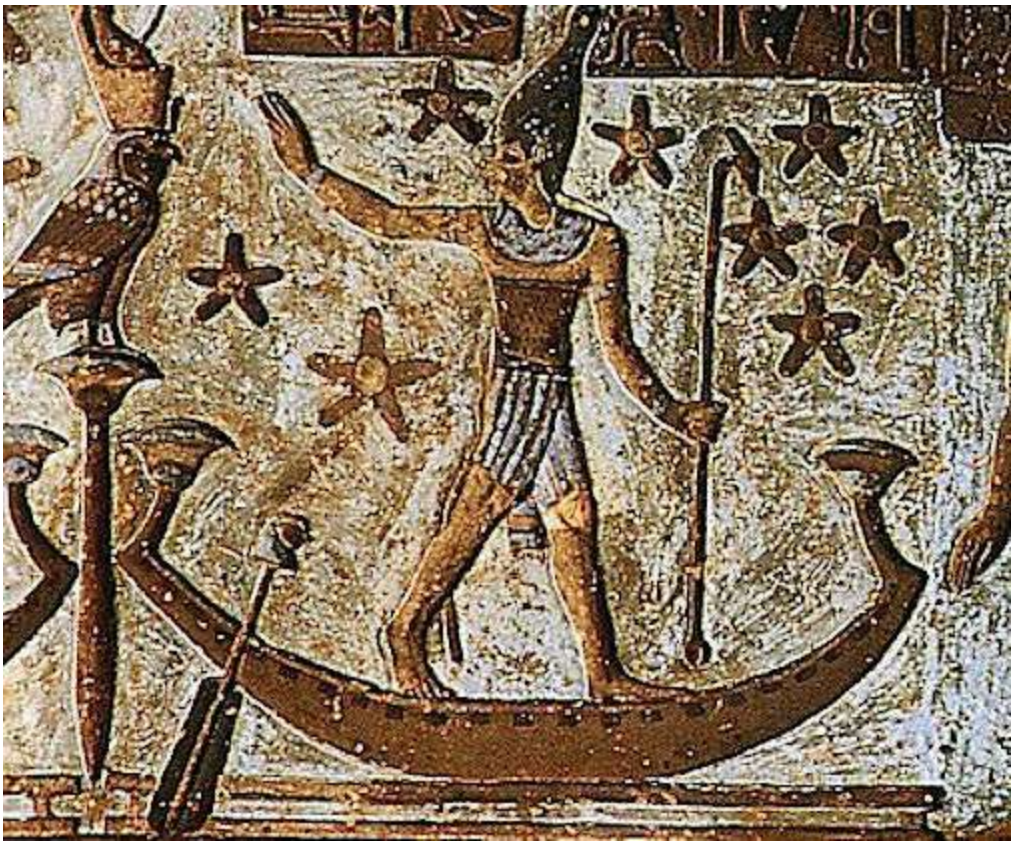
Thus, the sun god dies in the solstice, when then sun stands still, and

returns to life on the spring equinox as the new sun, the son of the sun god, and after 2160 years, as a new god represented by a new age. And all who die, may also be embraced by the light, to live again, among the stars which are gods.

Cosmology, therefore, had as its birth, death: death of the sun, death of those on Earth, who woujld ascend to haven as spirits and souls; but some of whom, after judgment, would be cast out of heaven; becoming a fallen star to live again on Earth, or to live forever in the underworld of eternal darkness, known as hell.







DEATH, DYING AND REBIRTH

The Cro-Magnon of the Paleolithic, and peoples of the Neolithic practiced mortuary rituals because they could also see beyond death, beyond one's personal demise, which is why these earthen graves contained tools, food, and ornaments even 30,000 years ago. The souls of the dead would need these items in the next world.

The dead, therefore, were believed to survive the experience of dying. It was believed that they would retain a personal identity, in the form of a personal soul, which would ascend to the heavens and join the abode of the spirits and the gods.

The ancients were exceedingly concerned about what happened after death, and what trials and tribulations they may experience in the hereafter as they ascended to heaven. And they worried about evil spirits, and the behavior of those souls who when alive had committed evil on Earth.

To protect the living, the enemy dead were sometimes decapitated, their hands and legs removed, and their eyes sewn shut and faces smashed, so that their souls would be unable to rise from the dead and cause mischief in the afterlife--even 50,000 years ago. The ancients did not necessarily believe that every soul would immediately ascend to heaven, but may remain tethered to the earth below.

Those souls that remain earth bound were often believed to be evil spirits, undeserving of a place among the gods and the stars. As detailed in the Egyptian and Tibetan Books of the Dead, it was also believed that some souls could lose their way and remain earthbound.

Yet others, such as the priesthood of the Roman Catholic Church, believed that souls almost never immediately ascended to heaven. Instead, the souls of the dead were believed to spend at least part of eternity in a realm called purgatory.

PURGATORY

Some conceive "purgatory" as a spirit-like world that exists between this reality and the reality of God. During the middle ages many Catholic theologians came to believe that the length of time a soul might remain in purgatory would depend on the nature and extent of their sins. Purgatory was like a jail sentence, and once sufficient punishment had been doled out, the soul was free to ascend to heaven.

Likewise, some of those of the Buddhist faith believed "that at death, the

self, the Atman, departs to another world, where it works out the consequences of its karma. Some of these worlds were pleasant, others were hells where retribution was suffered for evil deeds. When the consequences of its karma was worked out, the self was reincarnated" (Brandon, 1967, p.171).

Others of the Christian faith also came to believe that upon death the soul merely goes to sleep; that sleep is the fate of the soul following death until a second awakening at the time of the final judgment.

According to John Calvin "the souls of the faithful, after completing their term of combat and travail, are gathered into rest, where they await with joy the fruition of their promised glory; and thus all things remain in suspense until Jesus Christ appears as the Redeemer."

The Koran endorses certain aspects of this view, such that the dead will have no knowledge of the time that has elapsed since their death. And when the soul awakes to experience judgment day, they will think they have just awakened from sleep. Hence, the soul was believed to be unconscious while the body decayed, and is awakened by the trumpet heralding the last judgment.

The ancients, however, believed that the soul could depart the body during sleep, and that death was the final liberation of the soul. The soul did not sleep. Instead the soul could remain earth bound and observe all that took place below, or ascend to heaven where it would be embraced by the light.

However, as pointed out by the Egyptian and Tibetan Books of the Dead, the soul might also be embraced by darkness, or they may lose their way and could be harried for all eternity by demons and devilish monstrosities in the darkness of the underworld.

SUBTERRANEAN HELL

As the dead were often buried in the earth, it was believed by some that the soul may descend into the earth womb, into the subterranean realms of the spirits and gods of the dead.

The ancient Greeks believed that at death and with the dissolution of the unity of the body, thymos—the conscious self and the life principle—was released into the air, and transformed into a wraith, a shadowy image of the living person, known as the eidolon. It was the life principle, psyche, which descended into Hades, which was a huge subterranean pit deep beneath the

ground. There the life principle became a wraith, and existed with other eidolons, but devoid of self-consciousness in a state of perpetual and eternal gloom.

Greek thought was in some respects basically identical to that of the Sumerians, Akkadians, Babylonians, and Israelites who believed that the spirits of all the dead dwelled for all eternity in a dreary, lightless, subterranean abode. According to the Sumerians and Akkadians death involved a horrible transformation where the dead became a diseased, decaying, grisly being which descended to the underworld, "the land of no return."

According to the Hebrews, this terrible realm of darkness was called She'ol. She'ol, was where kings and peasants, rich and poor, good and evil, existed in a state of equal and horrible wretchedness. Hades and the Hebrew She'ol are identical. The good and the wicked, rich and poor, kings and peasants, all descended into hell and assumed this wraith-like existence in the realm of the dead.

Yet others preached that only the evil go to this subterranean hell. The righteous, the just, and the good, ascend to heaven and live in bliss for all eternity. However, if one went to heaven or hell depended on how one had lived their life, and how they were judged by the gods.

"For those who have disbelieved... shall roast in fire... and their bellies and skin shall be melted. To them it is said: Taste the punishment of the burning." -Koran

THE EVOLUTION OF HELL

"Jesus said: There is a light within a man of light, and it lights up the whole world. If he does not shine, he is darkness." -Gospel of Thomas.

In contrast to the light and bliss of "heaven," Hell has commonly been associated with darkness and the underworld. In part, the notion of an underworld is a direct consequence of burial practices, and perhaps the belief that sinners will fail to rise to heaven but instead will be condemned to a bleak existence deep beneath the Earth.

The belief in an underworld where sinners burn in hell, is also related to the worship of the sun as god. That is, during the day the sun god rules the Earth, but each evening it must pass through the underworld where it may be attacked by the demons of darkness. Every night, therefore, the sun god

would have to fight these demons, and would do so with the rays of the sun. That is, the sun-god would burn the enemies of god with the fire of the sun's rays. Hence, Hell also became associated with fire, such that, as these beliefs evolved, sinners and enemies of god would be sent to hell where they would not only be attacked by devils and demons, but would burn in flames for all eternity.

The belief in Hell and in demons and devils is world wide and vivid descriptions of a hellish underworld and its demonic denizens are also described in the Egyptian and Tibetan Books of the Dead. Indeed, these books were written so as to inform believers as to the mysteries of death and the trials and tribulations one might experience following death so that demons and other devilish monstrosities and misfortunes might be avoided.

For example, priests or relatives of the recently departed were expected to read various hymns, litanies, magical formula, spells, and incantations from the Egyptian Book of the Dead which would help protect the dead from the multitude of devils and fiends that would seek to devour and destroy the spirit-soul. "These powers of evil had hideous and terrifying shapes and forms, and their haunts infested the region through which the road of the dead lay when passing from this world to the Kingdom of Osiris" (Budge, 1994). According to the ancient Egyptians, the gods were basically powerless to protect the souls from these demons which could inflict horrible suffering upon the spirit souls for all eternity.

"Then the Lord of Death will place around thy neck a rope and drag thee along; he will cut off thy head, tear out thy heart, pull out thy intestines, lick up thy brain, drink thy blood, eat thy flesh, and gnaw thy bones; but thou will be incapable of dying. Even when the body is hacked to pieces, it will revive again and thy will be tortured for all eternity."-Tibetan Book of the Dead.

However, these evils can also be avoided which is the purpose of these texts. They serve as a roadmap to heaven. In this regard, these texts actually educate the reader as to "The Art of Dying" so that an undesirable and hellish death can be avoided.

Unfortunately, or so say these texts, many are condemned to Hell for all eternity. According to the Tibetan Book of the Dead, a hellish death is due to the "power of accumulated evil Karma." Likewise, according to the Egyptian Book of the Dead, spirit souls may be judged and condemned to hell for all eternity if they had behaved in an evil and unjust manner when living. Hence,

both texts warn of a judgment day and a life review and warn that those who have committed evil acts will be judged, found guilty, and then condemned.

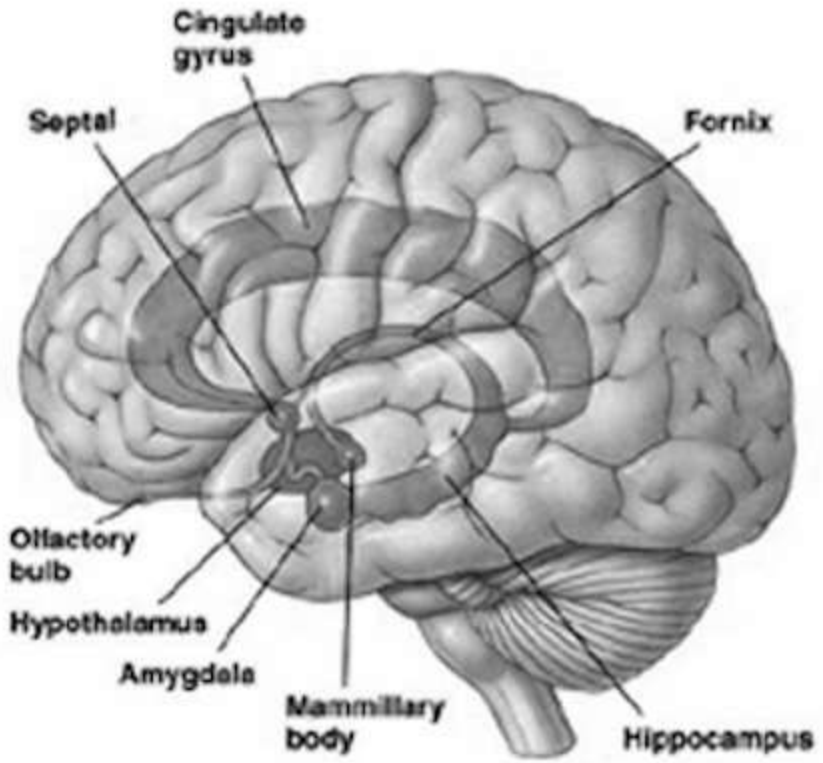
Hence, it can be deduced that by 6,000 years ago, that in addition to a heaven and hell, a moral-religious spiritual conscience and moral-consciousness has evolved. This is reflected by the religious conviction that the just and the unjust would be rewarded and punished in the next world after they had died; their good deeds often weighed against the bad.

As is now well established, a sense of morality and a personal conscience (as in: Let your conscience be your guide) is directly associated with the functional integrity of the frontal lobe (Joseph, 1986a, 1999a, 2014). The frontal lobes are concerned with anticipating consequences and serve to inhibit or redirect unacceptable impulses in order to avoid punishment.

It also appears that the frontal lobe had fully evolved and reached its peak levels of development and expansion during the Upper Paleolithic as described in earlier chapters. Although there is no physical evidence to indicate that Upper Paleolithic peoples had also evolved a moral conscience or a concern that the spirit soul would be punished for past misdeeds, Budge (1994) argues that the Book of the Dead and the beliefs that permeate the pyramid texts, were already quite ancient by the rise of the first Dynasty, and thus have pre-dynastic, and therefore, Upper Paleolithic origins.

It is noteworthy that although the Tibetan (and Egyptian) Book of the Dead warn of a judgment day, and describe all manner of Hellish devils and demons, this text repeatedly reminds the reader that these demonic entities are a product of one's own mind. They are illusions erupting from the depths of the primeval unconscious which is freed of the suppressive restraints of the every day reality and the illusions of this world

THE LIMBIC SYSTEM NEUROLOGY OF PERSONAL MEMORIES: HIPPOCAMPUS



When death comes, many are buried benearth the Earth, and if wealthy, in a tomb; an earth womb. Born of the womb, they return to the womb: from dust to dust, ashes to ashes. The ancients believed hell was benearth the Earth, or in a place of eternal darkness. Heaven was, in heaven. Thus the first cosmologies were developed based on beliefs about death, dying, and the ascension of souls.

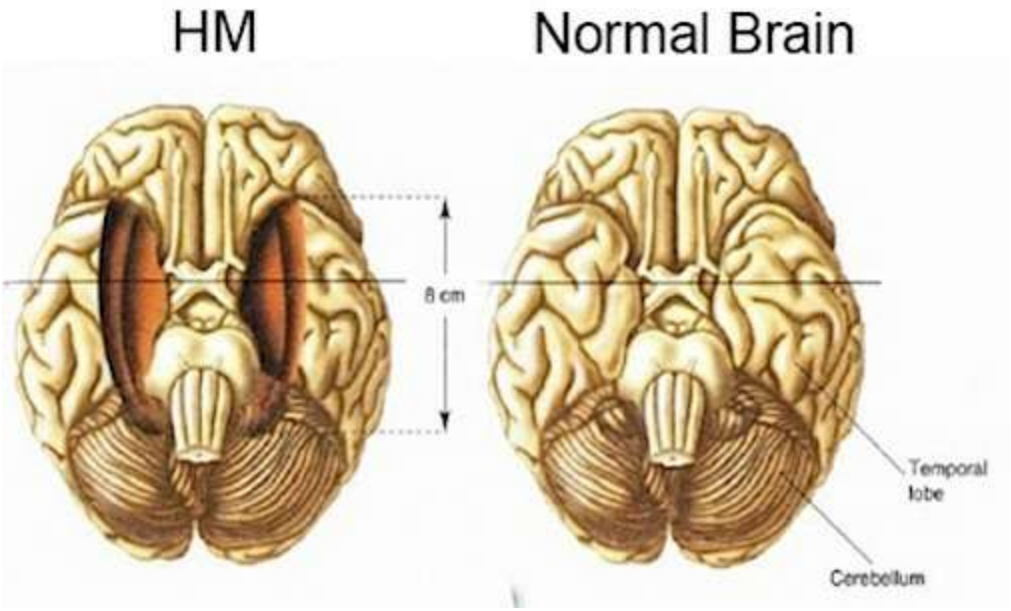
Although these spheres-of-after death life could be explained as existing in alternate dimensions, in a multi-verse of parallel existence; the ability to experience death and dying and ascension as a spirit, must have some basis in the brain. In later chapters, it is explained how hyperactivation, or rather, acceleration of brain activity, could be likened to Einstein's theory of relativity and the contraction of time-space. However, the brain also functions in terms of inhibition. Much of what is sensed, is filtered out, thereby protecting consciousness from being overwhelmed. One particular brain structure capable of perceiving multiple sensory impressions simultaneously, much of which is filtered out, is the limbic system.

There are a variety of conditions which can hyperactive the limbic system,

including death. The anticipation of death, the terror and dread of impending death, are also made possible by the limbic system. The limbic system can anticipate, and it can feel fear and anxiety in response to the unknown. As will be explained in later chapters, hyperactivation, or electrode stimulation of the limbic system can trigger the experience, or the hallucination, of leaving one's body, or seeing ghosts, demons, angels and even gods. Some of the primary structures of the limbic system include the amygdala and hippocampus. As is well known, the hippocampus is exceedingly important in memory, acting to place various short-term memories into long-term storage and retrieving short-term memories (Enbert & Bonhoeffer, 2009; Fedio & Van Buren, 1974; Frisk & Milner, 1990; Milner, 1966; 1970; Nunn et al., 2009; Penfield & Milner, 1958; Rawlins, 2005; Scoville & Milner, 1957; Squire, 2011; Victor & Agamanolis,2010). Presumably the hippocampus encodes new information during the storage and consolidation (long-term storage) phase, and assists in the gating of afferent streams of information destined for the neocortex by filtering or suppressing irrelevant sense data which may interfere with memory consolidation. Moreover, it is believed that via the development of long-term potentiation the hippocampus is able to track information as it is stored in the neocortex, and to form conjunctions between synapses and different brain regions which process and store associated memories.

Hence, if the hippocampus has been damaged the ability to convert short term memories into long term memories becomes significantly impaired. Memory for words, passages, conversations, and written material is also significantly impacted, particularly with left hippocampal destruction

Bilateral destruction of the anterior hippocampus results in striking and profound disturbances involving memory and new learning (i.e. anterograde amnesia). For example, one such individual who underwent bilateral destruction of this nuclei (H.M.), was subsequently found to have almost completely lost the ability to recall anything experienced after surgery. If you introduced yourself to him, left the room, and then returned a few minutes later he would have no recall of having met or spoken to you. Dr. Brenda Milner has worked with H.M. for almost 20 years and yet she is an utter stranger to him.



H.M. is in fact so amnesic for everything that has occurred since his surgery (although memory for events prior to his surgery is comparatively exceedingly well preserved), that every time he rediscovers that his favorite uncle died (actually a few years before his surgery) he suffers the same grief as if he had just been informed for the first time.

H.M., although without memory for new (non-motor) information, has adequate intelligence, is painfully aware of his deficit and constantly apologizes for his problem. “Right now, I’m wondering” he once said, “Have I done or said anything amiss?” You see, at this moment everything looks clear to me, but what happened just before? That’s what worries me. It’s like waking from a dream. I just don’t remember...Every day is alone in itself, whatever enjoyment I’ve had, and whatever sorrow I’ve had...I just don’t remember” (Blakemore, 1977, p.96).

Presumably the hippocampus acts to protect memory and the encoding of new information during the storage and consolidation phase via the gating of afferent streams of information and the filtering/exclusion (or dampening) of irrelevant and interfering stimuli. When the hippocampus is damaged there

results input overload, the neuroaxis is overwhelmed by neural noise, and the consolidation phase of memory is disrupted such that relevant information is not properly stored or even attended to. Consequently, the ability to form associations (e.g. between stimulus and response) or to alter preexisting schemas (such as occurs during learning) is attenuated.

AMYGDALA & HIPPOCAMPUS

There is considerable evidence which strongly suggests that the hippocampus plays an interdependent role with the amygdala in regard to memory; particularly in that they are richly interconnected, merge at the uncus, and exert mutual excitatory influences on one another. For example, it appears that the amygdala is responsible for storing the emotional aspects and personal reactions to events, whereas the hippocampus acts to store the cognitive, visual, and contextual variables.

Specifically, the amygdala plays a particularly important role in memory and learning when activities are related to reward and emotional arousal (Gaffan 1992; Gloor 1992, 1997; Halgren 1992; LeDoux 2012, 1996; Kesner 2012; Rolls 2002; Sarter & Markowitsch, 1985). Thus, if some event is associated with positive or negative emotional states it is more likely to be learned and remembered.

Because of its involvement in all aspects of social-emotional and motivational functioning, activation of the amygdala therefore, can evoke highly personal and emotional memories as it is highly involved in remembering emotionally charged experiences (Gloor, 1992, 1997; Halgren, 1981, 1992; Halgren, et al. 1978; Rolls, 1992; Sarter & Markowtisch, 1985). In fact, the amygdala becomes particularly active when recalling personal and emotional memories (Halgren, 1992; Heath, 1964; Penfield & Perot, 1963), and in response to cognitive and context determined stimuli regardless of their specific emotional qualities (Halgren, 1992). Moreover, depth electrode activation of the amygdala can even evoke memories of sexual intercourse, and traumatic memories that had long ago been forgotten.

Consider, for example, a case described by Gloor (1997, pp. 7-9) in which the right amygdala of a 21 year old patient “was briefly stimulated for 2.8 seconds at a low intensity. Immediately upon its onset” the patient reported “a feeling like falling into the water. When he was asked to elaborate, he replied that it was as if something had covered his eyes, nose and mouth.”

Again the stimulation was applied and the patient excitedly asked: “Could you do it again, Doctor? When asked why, he said he had the words on his lips to describe the feeling, but then could not.” The stimulation was then applied without warning for 4.4 seconds. The patient “opened his mouth, with an astonished look on his face.” A terrifying memory had suddenly come back to him. It was when he was eight years old and had been at a picnic when “A kid was coming up to me to push me into the water.... I was pushed by somebody stronger than me... a big fellow...” who pushed him under the water and had kept his head under the water so that he couldn’t breath.

However, once these emotional memories are formed, it sometimes requires the specific emotional or associated visual context to trigger their recall. If those cues are not provided or ceased to be available, the original memory may not be triggered and may appear to be forgotten or repressed. However, even emotional context can trigger memory (see also Halgren, 1992) in the absence of specific cognitive cues.

Similarly, it is also possible for emotional and non-emotional memories to be activated in the absence of active search and retrieval, and thus without hippocampal or frontal lobe participation. Recognition memory may be triggered by contextual or emotional cues. Indeed, there are a small group of neurons in the amygdala, as well as a larger group in the inferior temporal lobe which are involved in recognition memory (Murray, 1992; Rolls, 1992). Because of amygdaloid sensitivity to visual and emotional cues, even long forgotten memories may be evoked via recognition, even when search and retrieval repeatedly fails to activate the relevant memory store.

According to Gloor (1992), “a perceptual experience similar to a previous one can through activation of the isocortical population involved in the original experience recreate the entire matrix which corresponds to it and call forth the memory of the original event and an appropriate affective response through the activation of amygdaloid neurons.” This can occur “at a relatively non-cognitive (affective) level, and thus lead to full or partial recall of the original perceptual message associated with the appropriate affect.”

Thus the amygdala is responsible for emotional memory formation and recall whereas the hippocampus is concerned with recalling and storing verbal-visual-spatial and contextual details in memory. Thus, damage to the hippocampus can impair retention of context, and contextual fear

conditioning, but it has no effect on the retention of the fear itself or the fear reaction to the original cue (Kim & Fanselow 1992; Phillips & LeDoux 1992, 1996; Rudy & Morledge 1994). In these instances, fear-memory is retained due to preservation of the amygdala. However, when both the amygdala and hippocampus are damaged, striking and profound disturbances in memory functioning result.

Therefore, the role of the amygdala in memory and learning seems to involve activities related to reward, orientation, and attention, as well as emotional arousal and social-emotional recognition (Gloor, 1992, 1997; Rolls, 2012; Sarter & Markowitsch, 1985). If some event is associated with positive or negative emotional states it is more likely to be learned and remembered. That is, reward increases the probability of attention being paid to a particular stimulus or consequence as a function of its association with reinforcement.

Moreover, the amygdala appears to reinforce and maintain hippocampal activity via the identification of motivationally significant information and the generation of pleasurable rewards (through action on the lateral hypothalamus). However, the amygdala and hippocampus act differentially in regard to the effects of positive vs. negative reinforcement on learning and memory, particularly when highly stressed or repetitively aroused in a negative fashion. For example, whereas the hippocampus produces theta in response to noxious stimuli the amygdala increases its activity following the reception of a reward (Norton, 1970).

THE HIPPOCAMPUS & ASSOCIATED MEMORY STRUCTURES

Reverberating neurons are presumably located in various regions of the neocortex, and are apparently bound together via the simultaneous activity and steering influences involving the frontal lobes (Joseph, 1986a, 2012), dorsal medial thalamus, and in particular the amygdala and hippocampus (Gloor, 1997; Graff-Radford, et al. 200; Lynch, 1986; Rolls, 2012; Squire,20-2). These structures are all interlinked and highly involved in attention, arousal, and memory functioning, and probably act together so as to establish and maintain specific neural circuits and networks associated with specific memories (e.g., Brewer et al., 1998; Squire, et al,. 1992; Tulving et al., 1994; Wagner et al., 1998). For example, these different networks and neurons may be linked via the steering influences exerted by the frontal lobes etc., which

can selectively activate or inhibit these memories and associated tissues in a coordinated fashion, and which can tie together certain perceptual experiences so as to form a complex multi-modal memory (e.g., Dolan et al., 1997; Joseph, 1982, 1986a, 1988a, 1999a; Kapur et al., 1995; Squire, et al,. 1992; Tulving et al., 1994; Dolan et al., 1997; Brewer et al., 1998; Wagner et al., 1998).

The frontal lobes, however, not only assist in the recollection of memories (Brewer et al., 1998; Wagner et al., 1998), but in conjunction with the limbic system, can induce feelings of guilt about those memories. Presumably, at death, the amygdala and hippocampus act to trigger the recollection of long term and highly personal memories, whereas the frontal lobes may serve to pronounce judgment and impose guilt. Indeed, it has been well established that the frontal lobe not only acts to inhibit memories and various impulses, but serves as a moral conscience which passes judgment on.

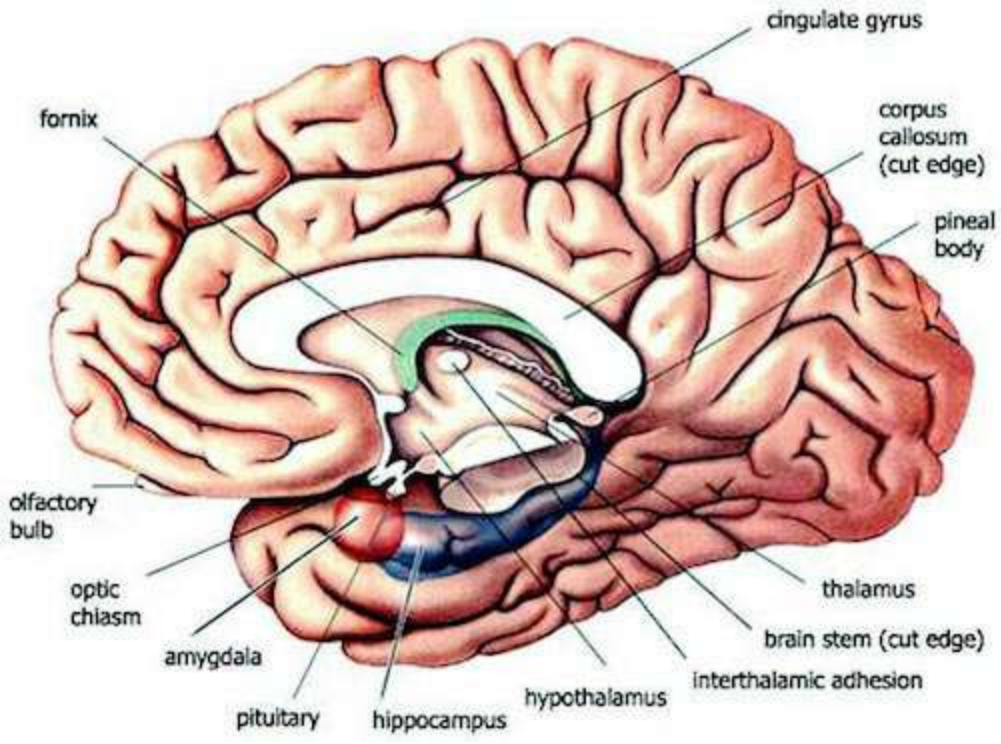
AMYGDALA & HIPPOCAMPAL INTERACTIONS: HALLUCINATIONS

Direct electrical stimulation of the temporal lobes, hippocampus and particularly the amygdala (Gloor, 1990, 1997) not only results in the recollection of images, but in the creation of fully formed visual and auditory hallucinations (Gloor 1992, 1997; Halgren 1992; Halgren et al., 1978; Horowitz et al., 1968; Malh et al., 1964; Penfield & Perot, 1963). It has long been know that tumors invading specific regions of the brain can trigger the formation of hallucinations which range from the simple (flashing lights) to the complex. The most complex forms of hallucination, however, are associated with tumors within the most anterior portion of the temporal lob; i.e. the region containing the amygdala and anterior hippocampus.

Similarly, electrical stimulation of the anterior lateral temporal cortical surface results in visual hallucinations of people, objects, faces, and various sounds (Gloor 1992, 1997; Halgren 1992; Horowitz et al., 1968)—particularly the right temporal lobe (Halgren et al. 1978). Depth electrode stimulation and thus direct activation of the amygdala and/or hippocampus is especially effective. For example, stimulation of the right amygdala produces complex visual hallucinations, body sensations, deja vus, illusions, as well as gustatory and alimentary experiences (Weingarten et al. 1977), whereas Freeman and Williams (1963) have reported that the surgical removal of the

right amygdala in one patient abolished hallucinations. Stimulation of the right hippocampus also produces memoryand dream-like hallucinations (Halgren et al. 1978; Horowitz et al. 1968).

The amygdala also becomes activated in response to bizarre stimuli (Halgren, 1992). Conversely, if activated to an abnormal degree, it may produce bizarre memories and abnormal perceptual experiences. In fact, the amygdala contributes in large part to the production of very sexual as well as bizarre, unusual and fearful memories and mental phenomenon including dissociative states, feelings of depersonalization, and hallucinogenic and dream-like recollections (Bear, 1979; Gloor, 1986, 1992, 1997; Horowitz et al. 1968; Mesulam, 1981; Penfield & Perot, 1963; Weingarten et al. 1977; Williams, 1956).



Single amygdaloid neurons receive a considerable degree of topographic

input, and are predominatly polymodal, responding to a variety of stimuli from different modalities simultaneously (Amaral et al. 1992; O'Keefe & Bouma, 1969; Ono & Nishijo, 1992; Perryman, Kling, & Lloyd, 1987; Rolls 1992; Sawa & Delgado, 1963; Schutze et al. 1987; Turner et al. 1980; Ursin & Kaasa, 1960; Van Hoesen, 1981). However, much of this information is filtered out, as it is not necessary to taste what we see, or to feel what we hear, and so as to prevent the brain from being overwhelmed. In part, this massive sensory filtering is made possible via serotonic (5HT) which suppresses synaptic activity in the visual cortex, the lateral (visual) geniculate nucleus of the thalamus as well as the amygdala and throughout the neocortex (Curtis & Davis 1962; Marazzi & Hart 1955). For example, in response to arousing stimuli, 5-HT is released (Auerbach et al. 1985; Roberts, 1984; Spoont, 1992) which acts to narrow and focus attentional and perceptual functioning so that stimuli which are the most salient are attended to. That is, 5HT appears to be involved in learning not to respond to stimuli that are irrelevant and not rewarding (See Beninger, 1989). These signals are filtered out and suppressed.

By contrast, substances which block 5HT transmission -such as LSDresults in increased activity in the sensory pathways to the neocortex (Purpura 1956), such that information that is normally filtered out is perceive. LSD acts on serotonin (5HT) 5HT restricts perceptual and information processing and in fact increases the threshold for neural responses to occur at both the neocortical and limbic level.

As is well known, LSD can elicit profound hallucinations involving all spheres of experience. Following the administration of LSD high amplitude slow waves (theta) and bursts of paroxysmal spike discharges occurs in the hippocampus and amygdala (Chapman & Walter, 1965; Chapman et al. 1963), but with little cortical abnormal activity. In both humans and chimps, when the temporal lobes, amygdala and hippocampus are removed, LSD ceased to produce hallucinatory phenomena (Baldwin et al. 1959; Serafintides, 1965). Moreover, LSD induced hallucinations are significantly reduced when the right vs. left temporal lobe has been surgically ablated (Serafintides, 1965).

Intense activation of the temporal lobe and amygdala has also been reported to give rise to a host of sexual, religious and spiritual experiences; and chronic hyperstimulation (i.e. seizure activity) can induce some

individuals to become hyper-religious or visualize and experience ghosts, demons, angels, and even God, as well as claim demonic and angelic possession or the sensation of having left their body (Bear 1979; Gloor 1986, 1992; Horowitz, Adams & Rutkin 1968; MacLean 1990; Mesulam 1981; Penfield & Perot 1963; Schenk, & Bear 1981; Weingarten, et al. 1977; Williams 1956).

In consequence, under conditions such as death, these limbic system structures may become excessively aroused, freed of inhibitory restraint, and begin to recall and judge personal memories, as well as hallucinate all manner of forms and images, including those of gods, demons, angels and devils who pass judgment.

JUDGMENT DAY

It is commonly believed that some souls will go to heaven, and others would spend eternity in hell. The determination of which soul would go where, thus gave rise to the concept of being judged. The nature of one's afterlife depended on how one was judged and the nature of one's good and evil deeds. Death, therefore, also became a final judgment day where the wicked were punished, and the good rewarded with eternal heavenly bliss.

We do not know if the Cro-Magnon believed in hell or a final judgment. The ancient Sumerians, Babylonians, and Egyptians, as well as the ancient peoples of the Indus valley, and ancient China clearly believed that a final judgment awaited man after death.

For example, in the Rig-Veda we are told that the good are invited to live in heaven, whereas the wicked are hurled by the deities Soma and Indra into an eternally dark prison from whence there is no return.

According to the ancient Egyptians, the woman and man who respected and maintained maat— that is, truth, justice, and righteousness—would achieve a state of eternal beatitude, whereas those who did not could expect to suffer in a dreary Hellish underworld where they and the enemies of the sun god Ra would burn for all eternity—roasted by the burning rays of the sun. Most of these ideas were laid out in considerable detail in the Egyptian Book of the Dead, the Pyramid Texts.

The Pyramid Texts were composed and compiled by the priests of Heliopolis, to help the dead pharaohs achieve eternal bliss in the afterlife. Only the morally just could expect to enter heaven. Nevertheless, the dead,

both good and evil, would have to defend themselves against every accusation. Life in the afterworld could be easily imperiled by accusations of those who had been wronged.

Yet, in ancient Egypt, it was believed that the chief accuser would be memory, the dead's own memories, and the dead's own heart would recount and remember their good or evil deeds. Indeed, it would be hell to be plagued for all eternity by every bad memory and all associated feelings of guilt and psychic pain.

This same belief is recounted in the Tibetan Book of the Dead: "You are now before Yama, King of the Dead. The mirror in which Yama seems to read your past is your own memory, and also his judgment is your own. It is you yourself who pronounces your own judgment, which in turn determines your rebirth."

However, whereas the Tibetan Buddhists believed that the souls of the dead passed judgment on themselves, the ancient Egyptians believed that the Great God Osiris would pass judgment. Osiris, would hold and weigh the scales of justice.

JUDGMENT

The Great God of the ancient Egyptians did not pass judgment alone, for in this he was assisted by a council of 12, a tribunal of the Great God. As detailed in the Book of the Dead, the jackal-headed god of death, Anubis, adjusts the scales of justice which will determine one's fate; to his right stands Thoth, the ibis-headed god of wisdom—the divine scribe who records the final verdict. And behind Osiris crouches a horrible hybrid monster, the eater of the dead.

"The council which judges the deficient, thou knowest that they are not lenient on the day of judging the miserable, the hour of doing their duty. It is woe when the accuser is one of knowledge. Do not trust in length of years, for they regard a lifetime as but an hour. A man remains after death, and his deeds are placed beside him in heaps. However, existence yonder is for eternity, and he who complains of it is a fool. But as for him who reaches it without wrong-doing, he shall exist yonder like a god, stepping out freely like the lords of eternity." -Egyptian Book of the Dead.

Not only is it futile for the guilty to proclaim their innocence, but the consequences, the manner in which the balance sways depends on one's own

heart and memories, which will testify against the dead. According to the ancient Egyptians, the heart will be laid upon the scales and weighed against the lightness of a feather and balanced against Maat; Maat being truth.

good outweighs the evil, salvation would be at hand, for it could be expected that "the offenses of which thou art accused will be eliminated, thy fault wiped out by the balancing of the balance, in the day of the evaluation of qualities; thou causes the weighing to be made as Thoth." -Egyptian Book of the Dead.

As noted, according to the ancient Egyptians the final judgment is listed into a book. Jewish, Christian and Islamic faith also involves a book in which the final judgment is listed.

"And I saw the dead, great and small, standing before the throne, and books were opened. Also another book was opened, which is the book of life. And the dead were judged by what was written in the books, by what they had done." -R.S.V. 10:11-15.

According to the ancient Hebrews, a sinner might have his name erased from the book: "who ever sins against me, I will blot out of my book." — Exodus 33:33. And with this erasure, by having one's name blotted out, the soul of the dead would be condemned for all eternity, forgotten forever, never to be remembered even by the Lord God.

THE LIFE REVIEW: HEART OF A MEMORY

The notion of being judged and a weighing of one's sins is a common belief that recurs throughout history. The ancient Chinese, although practicing ancestor worship, also believed that sinners would roast in hell. The souls of the ancient Chinese were judged by officials of the underworld which was comprised of 10 tribunals. The soul would typically kneel before these judges next to whom would stand officers with books with the records against which the soul would be judged.

Similar beliefs were held by the ancient Greeks. For example, after Odysseus met with the ghost of Achilles in Hades he states that: "I saw Minos, the glorious son of Zeus, golden scepter in hand, giving judgment to the dead from his seat, while they sat and stood about the king through the wide-gated house of Hades."

According to the ancient Egyptians, the chief prosecutor and the witness against the accused, would be the accused themselves. That is, the dead, their heart, would be forced to testify against themselves. Memories, both good and bad, would be recalled involuntarily. That is, the dead would undergo a life review.

In pictures of judgment day, we see that on the scales rest the hieroglyphic sign of the heart, the ib, and a feather. And before the balance stands the dead. If the soul has lived a righteous life, his heart will detail his good deeds which are weighed against truth. If he has done evil, he implores his heart not to witness against him. He struggles not to remember. But to no avail.

Death, to the ancients, therefore, involved a life review, where one's memories are recalled and one's life is judged on the scales of good and evil, on the balance of truth.

Although we now know that the amygdala, in conjunction with the hippocampus becomes particularly active when recalling personal and emotional memories (Halgren, 1992; Heath, 1964; Penfield & Perot, 1963), the ancients believed these memories were stored in the heart which served as one's conscience. Whereas we localized the transmitter of god to the limbic system, the ancient Egyptians believed that the heart was "the god which is in man." On the other hand, the amygdala directly affects cardiovascular functioning and thus the beating of the heart.

The ancient Egyptians experienced a considerable degree of apprehension about judgment day and the fact that their hearts would witness against them. The Egyptians were painfully aware that they might be condemned to hell for all eternity by their own evil memories. These same concerns also appear in the Tibetan Book of the Dead:

“You are now before Yama, King of the Dead. In vain will you try to lie, and to deny or conceal the evil deeds you have done. The Judge holds up before you the shinning mirror of Karma, wherein all your deeds are reflected. But again you have to deal with dream images, which you yourself have made, and which you project outside, without recognizing them as your own work. The mirror in which Yama seems to read your past is your own memory, and also his judgment is your own. It is you yourself who pronounces your own judgment, which in turn determines your rebirth.” - Tibetan Book of the Dead.

The weighing of the heart and undergoing a final judgment is not shared by all religions. However, judgment day has been a common belief among many different religions since the Neolithic, including Christian, Greek, Roman, Christian and the apocryphal writings of the Jews: “The spirits of the dead shall be separated. A division has been made for the spirits of the righteous, in which there is a bright spring of water. And such has been made for sinners when they die and are buried in the earth and judgment. Here their spirits shall be set apart in great pain.”-Book of Enoch

THE SECOND DEATH

“So I prophesied as I was commanded: and as I prophesied, there was a noise, and behold, a rattling; and the bones came together, bone to its bone. And as I looked, there were sinews on them, and flesh had come upon them, and skin had covered them; but there was no breath in them. Then he said to me, Prophesy to the breath, prophesy, son of man, and say to the breath, Thus says the Lord God: Come from the four winds, O breath, and breathe upon these slain, that they may live. So I prophesied as he commanded me, and the breath came into them, and they lived, and stood upon their feet, an exceedingly great host.” -Ezekial.

Yahweh, Ezekial tell us, has the power to resurrect the dead, to join together even disarticulated bones, and turn them into human bodies, giving them life. This is the second life after death. And there is a second death that awaits all sinners:

“Then Raphael answered, one of the holy angels who was with me, and said unto me: These hollow places have been created for this very purpose, that the spirits of the souls of the dead should assemble therein, ye that all the souls of the children of men should assemble here. And these places have

been made to receive them till the day of their judgment and till the appointed time period till the judgment comes upon them."-Book of Enoch

In later Vedic literature, including the Brahmanas, we are told of a second death. All souls would suffer a penalty that would be paid in the form of dying again and again, possibly for all eternity. This is called samsara, the transmigration of the soul. Thus according to the ancient peoples of the Indus Valley, after one dies, they could suffer a second death, and then a third death, and so on, for all eternity, each subsequent life determined by one's character and behavior in previous lives.

Although the Greeks thought it possible to achieve a state of blessed eternal beatitude, they also believed that some souls fall from their primal state of beatitude and undergo a series of incarnations, beginning in insect or bestial form, and that they then have to live and die ten thousand deaths before regaining a human state. Only enlightened souls can escape this endless cycle of birth and death.

According to modern Christian faiths, the dead also suffer a second death, which may be more horrible than the first. That is, after the soul awakens from purgatory: "The Son of man will send his angels, and they will gather out of his kingdom all causes of sin and all evildoers, and throw them into the furnace of fire; there men will weep and gnash their teeth. Then the righteous will shine like the sun in the kingdom of their father." -R.S.V. 13:41-43.

"Then I saw a great white throne and him who sat upon it; from his presence earth and sky fled away, and no place was found for them. And I saw the dead, great and small, standing before the throne, and books were opened. Also another book was opened, which is the book of life. And the dead were judged by what was written in the books, by what they had done. And the sea gave up the dead in it. Death and Hades gave up the dead in them, and all were judged by what they had done. Then Death and Hades were thrown into the lake of fire. This is the second death, the lake of fire; and if any one's name was not found written in the book of life, he was thrown into the lake of fire." -R.S.V. 10:11-15.

"The cowardly, the faithless, the polluted, murderers, fornicators, sorcerers, idolaters, and all liars, their lot shall be the lake that burns with fire and brimstone, which is the second death." -Revelation of St. John, II:184, 4356-457.

"Do you not know that the unrighteous will not inherit the kingdom of

God? Do not be deceived; neither the immoral, nor idolaters, no adulterers, nor homosexuals, nor thieves, nor the greedy, nor drunkards, nor revivlers, nor robbers, will inherit the kingdom of God."-Paul, Galatians, V 22-23.

And yet, there is a second salvation.

Idolaters, adulterers, homosexuals, thieves, the greedy, drunkards, revivlers, and robbers... And such were some of you! But you were washed, you were sanctified, you were justified in the name of the Lord Jesus Christ and in the Spirit of our god." -Paul, Galatians, V 22-23.

Hence, it was also believed possible to escape the second death if one had lived a life free of sin, or if one repented for their sinful ways. And this same belief is held by those of the Hindu and Buddhist faith. That is, if the consequences of one's Karma could be worked out by the self, the Atman before the next reincarnation, the soul would not have to be born again only to die again and yet again. As to those who failed to work out the consequences of their Karma, or those who had lived a life of the utmost evil, their lot would become an eternal hell.

HELL: JUDGMENT AND PUNISHMENT

Although the Sumerians and ancient Hebrews and Greeks initially believed that both good and evil, rich and poor, would descend to hell, some also believed that She'ol, Hades, and Hell, were places of judgment, where punishments were doled out to the wicked.

"Upon the termination of life they were brought to trial; and, according to their sentence, some go to prison-houses beneath the earth, to suffer for their sins, while others, by virtue of their trial, are borne lightly upwards to some celestial spot, where they pass their days in a manner worthy of the life they lived." -Plato, Phaedrus.

In ancient Chinese religion, the realm of the dead was believed to consist of seven Hells where the evil would roast for all eternity. Likewise, in ancient Egypt, Greece, the Middle East, and Catholic Rome, punishment for the wicked, for the enemies of god, became eternal hell fire and all manner of demonic horrors.

"And I" the Apostle Peter "saw also another place very squalid; and it was a place of punishment, and they that were punished and the angels that punished them had their raiment dark, according to the air of the place. And some there were hanging by their tongues; and those were they that

blasphemed the way of righteousness, and under them was laid fire flaming and tormenting them... and there were others, women, hanged by their hair above that mire which boiled up; and these were they that adorned themselves for adultery... And in another place were gravel-stones sharper than swords or any spit, heated with fire, and men and women clad in filthy rages rolled upon them in torment... and others being cast down from a great precipice to the rocks below..."

"For those who have disbelieved... shall roast in fire... and their bellies and skin shall be melted. To them it is said: Taste the punishment of the Burning." -Koran

AFTER-DEATH, OUT-OF-BODY, ASTRAL PROJECTION: THE BOOK OF THE DEAD

"The Book of the Dead" is the title given to the collection of mortuary texts, also referred to as Pyramid texts, which the ancient Egyptian theologians composed for the benefit of the dead. However, they were first called the "book of the dead" or "a dead man's book" by tomb robbers, as these texts were commonly found in the dead man's coffin. During the sixth Dynasty, the common name for the Book of the Dead was "manifested in the light" or "embraced by the light."

According to E.A. Wallis Budge, Late Keeper of the Egyptian and Assyrian Antiquities of the British Museum, these texts were already quite ancient by the rise of the first dynasty, over 6,000 years ago. The predynastic Egyptians "were quite certain that men did not perish when they died, but that some part of a man departed after death to some place where he would renew his life in some form, according to the dictates of some divine being" (Budge, 1994, p. 4).

According to the Book of the Dead, at death the spirit-soul of the deceased would arise from the body, and although translucent and transparent to the living, this spirit-soul would at first hover above and look upon the body and could see and hear what was taking place below (chapter CLXXVII). The spirit-soul may then depart, only to return to visit the body (e.g. chapter LXXXIX: The Soul Visiting the Body which Lies on a Bier), sometimes even reanimating the body (chapter XCII), such that the dead might live again in this world.

Like their Paleolithic predecessors, the walls of all Egyptian tombs and all

but three of the hundreds of pyramids that dot the land, were graced with paintings of all manner of animal life and realistic scenes of the every day life to which they were accustomed. And within these tombs dwelled the ka, a spirit-like force which resided in a ka-statue of the dead person. These statues were exact replicas of the dead, that is, when they were alive.

It was the ba, the soul of the dead, which the Egyptians believed ascended to heaven. The ba would sometimes be depicted in flight, as a human-headed bird. Upon entering heaven the dead achieved the status of an akh—a "glorified being" that had reached completeness of attainment.

However, as detailed in the Egyptian Book of the Dead, prior to entering heaven (Anu), the spirit-soul of the deceased might "fly through the air" (chapter XCII) "pass over the earth" (chapter IV), such that it could move freely from place to place, before entering a tunnel or realm of darkness, and then arising into the sky to the abode of the gods in heaven at which point they bask in "a shining, glorious light" (Budge, 1994).

Similarly, according to Book I, of the Bardo, Tibetan Book of the Dead, following death the deceased will be enveloped with a "Clear Light" of "Wisdom and the Knower will experience the shining, dazzling, glorious, Radiance of the Clear light of Pure Reality, the All Good. Thine own consciousness, shining, void, and inseparable from the Great Body of Radiance, hath no birth, nor death, and is the Immutable Light—Buddha Amitabha."

Likewise, according to the Egyptian Book of the Dead, the soul ascends into the sky to theabode of the gods in heaven at which point the dead bask in "a shining, glorious light" and are led into the presence of dead relatives and brethren, and finally to the divine being Osiris, who is said to have made "men and women to be born again" and where they then dwell in bliss for all eternity having achieved everlasting life: "My soul is God. My soul is eternity" (Budge, 1994).

It is noteworthy that the soul, at first, usually does not know it is dead, that the body has died. According to the Tibetan Book of the Dead: "When the consciousness-principle gettest outside the body, it sayeth to itself, Am I dead, or am I not dead? It cannot determine. It can see that the body is being stripped of its garments. It seeth its relatives and heareth the weepings and wailings of friends and relatives, and although it seeth them and heareth them calling upon him, they seeth him not."

OUT-OF-BODY AND AFTER-DEATH EXPERIENCES

The notion of a soul leaving the body following death is a common belief among almost all religions. Again, some believe that the soul may fall asleep, whereas others believe it will either ascend to heaven or descend into hell. And, as noted, we are also told that the soul of the dead may linger upon the Earth, may remain tethered to the body, or may even return to visit the dead body, sometimes hovering above it, and in rare instances, somehow reanimating the body, such that the dead come back to life.

Likewise, among modern day people, some children and adults who have been declared "clinically" dead have returned to life. And many of those who subsequently return to life, have reported that after "dying" they left their body and floated above the scene (Eadie 1992; Rawling 1978; Ring 1980). And, at first, many do not realize they are dead.

According to modern accounts, typically they become increasingly euphoric as they float above their body, after which they may float away, become enveloped in a dark tunnel and then enter a soothing radiant light. And later, when they come back to life, they may even claim conscious knowledge of what occurred around their body while they were dead and floating nearby.

"Lisa" for example, was a 22 year old college coed with no religious background or spiritual beliefs, who was badly injured in an auto accident when the windshield collapsed and all but completely severed her arm. According to Lisa, when she got out of the car her was blood spraying everywhere and she only walked a few feet before collapsing. Apparently an ambulance arrived in just a few minutes. However, the next thing she noticed was that part of the time she was looking up from the ground, and part of the time she was up in the air looking down. From above she could see the ambulance crew working, picking up her body, placing it on a gurney and into the ambulance.

According to Lisa, during the entire ride to the hospital it was like she was half in and half out of the ambulance, as if she were running along outside or just extending out of the vehicle watching the cars and trees go by. When they got to the hospital she was no longer attached to her body but was floating up and down the halls, watching the doctors and nurses and attendants. One doctor in particular drew her attention because he had a big

belt buckle with his name written on it. She could even read it and it said "Mike."

According to Lisa, she was "tripping out, bobbing up and down the halls, just checking everything out" when she noticed a girl lying on a gurney with several doctors and nurses working frantically. When she floated over and peered over the shoulder of one of the doctors to take a look she suddenly realized the girl was her and that her hair and face were very bloody and needed to be washed. At that point she realized she was floating well above her body and the doctors, and that she looked to be "dead." Lisa said she did not feel afraid or upset, although the fact that her hair was bloody and dirty bothered her.

She soon floated up and outside the Emergency room and was enveloped in a total blackness, "like I was passing through a tunnel at the end of which was a light which became brighter and more brilliant, radiating outward." The light soon enveloped her body which made her feel exceedingly happy and very warm. A few moments later she heard the voice of her grandmother who had died when Lisa was a young girl. Although Lisa had no memory of this grandmother, she nevertheless recognized her and felt exceedingly happy. However, her grandmother very sorrowfully told her it was "too soon" she would have to "go back." Lisa didn't want to go back, but had no choice. She was drawn away from the light and felt herself falling only to land with a painful thump in her own body. At this point she moved her hand which alerted one of the emergency room staff that Lisa was no longer dead.

Lisa had no religious training and had never heard of "near death experiences" (she was injured in 1982). After returning to life she only reluctantly explained what had happened when she was questioned by one of her doctors.

Lisa also claimed that while she was dead and floating about the emergency room that she saw and heard what was going on around her after she died, and upon coming back to life she was able to accurately recall everything that occurred in the emergency room up to the point when she was enveloped in darkness. She was able to accurately describe "Mike" (who in fact wore a belt buckle engraved with "Mike"), most of the staff who attended her, as well as the conversations that occurred around her as well as some of the other patients.

Similar "after death" claims of leaving and floating above the body, and

seeing everything occurring below, are common (Eadie 1992; Moody 1977; Rawling 1978; Ring 1980; Sabom 1982; Wilson 1987), and, as noted, are even reported in the 6,000 year old Egyptian Book of the Dead (Budge 1994), as well as the Tibetan Book of the Dead (the Bardo Thodol) which was composed over 1,300 years ago (Evans-Wentz 1960). Approximately 37% of patients who are resuscitated report "out of body" experiences (Ring 1980).

Consider for example, the case of Army Specialist J. C. Bayne of the 196th Light Infantry Brigade. Bayne was "killed" in Chu Lai, Vietnam, in 1966. He was simultaneously machine gunned and struck by a mortar. According to Bayne, when he opened his eyes he was floating in the air, looking down on his crumpled, burnt, and bloody body, and he could see a number of Vietcong who were searching and stripping him:

"I could see me... it was like looking at a mannequin laying there... I was burnt up and there was blood all over the place... I could see the Vietcong. I could see the guy pull my boots off. I could see the rest of them picking up various things... I was like a spectator... It was about four or five in the afternoon when our own troops came. I could hear and see them approaching... I could see me... It was obvious I was burnt up. I looked dead... they put me in a bag... transferred me to a truck and then to the morgue. And from that point, it was the embalming process."

"I was on that table and a guy was telling a couple of jokes about those USO girls... all I had on was bloody undershorts... he placed my leg out and made a slight incision and stopped... he checked my pulse and heartbeat again and I could see that too...It was about that point I just lost track of what was taking place... [until much later] when the chaplain was in there saying everything was going to be all right... I was no longer outside. I was part of it at this point" (reported in Wilson, 1987, pp 113114; and Sabom, 1982, pp 81-82).

Some surgery patients, although ostensibly "unconscious" due to anesthesia, are also able to later describe conversations and related events that occurred during the operation (Furlong, 1990; Kilhstrom, et al. 1990; Polster, 1993). Hence, the notion that those who are "clinically dead" or near death may recall various events that occurred while they were ostensibly "dead" should not be dismissed out of hand. Moreover, some surgery patients also claim to "leave their bodies" while they were "unconscious" and claim to recall seeing not just the events occurring below, but in one case, dirt on top

of a light fixture (Ring 1980). “It was filthy. I remember thinking, ‘Got to tell the nurses about that.”

Did the above surgical patient or Lisa or Army Specialist Bayne really float above and observe their bodies and the events taking place below? Or did they merely transpose what they heard (e.g. conversations, noises, etc.) and then visualize, imagine, or hallucinate an accompanying and plausible scenario? This seems possible, even in regard to the “filthy” light fixture. On the other hand, not all those who have an “out of body” hear conversations, voices, or even sounds. Rather, they may be enveloped in silence.

“I was struck from behind... That’s the last thing I remember until I was above the whole scene viewing the accident. I was very detached. Everything was very quiet. This was the amazing thing about it to me... I could see my shoe which was crushed under the car and I thought: Oh no. My new dress is ruined... I don’t remember hearing anything. I don’t remember anybody saying anything. I was just viewing things... like I floated up there...” (Sabom, 1982; p. 90).

Moreover, even individuals born blind experience these “near death” hallucinations. And although blind, while dead they will see for the first time. However, whereas many who experience life after death find the experience exhilarating, others respond with feelings of extreme dread and terror. Death is not a pleasant experience.

FEAR AND OUT-OF-BODY EXPERIENCES

The prospect of being terribly injured or killed in an auto accident or fire fight between opposing troops, or even dying during the course of surgery, are often accompanied by fear. It is also not uncommon for individuals who experience terror to report perceptual and hallucinogenic experiences, including dissociation, depersonalization and the splitting off of ego functions. They may feel as if they have separated from their bodies and floated away, or were on the ceiling looking down (Campbell 1988; Courtois 1995; Grinker and Spiegel 1945; James 1958; Neihardt and Black Elk 1932/1989; Noyes and Kletti 1977; Parson 1988; Southard 1919; Terr 1990). Consider the following accounts:

“The next thing I knew I wasn’t in the truck anymore; I was looking down from 50 to 100 feel in the air.” “I had a clear image of myself... as though watching it on a television screen.” “I had a sensation of floating. It was

almost like stepping out of reality. I seemed to step out of this world" (Noyes and Kletti 1977).

Or as a close friend described his experience: "I was shooting down the freeway doing about 100 in my Mustang when a Firebird up ahead suddenly cut me off. As I switched lanes to avoid him, he also switched lanes at which point I hit the breaks and began to lose control. The Mustang began to slide and spin... I felt real terror... I was probably going to be killed... I was trying to control the Mustang and avoid turning over, or hitting any of the surrounding cars or the guard rail... time seemed to slow down and then I suddenly realized that part of my mind was a few feet outside the car looking all around; zooming above it and then beside it and behind it and in front of it, looking at and analyzing the respective positions of my spinning Mustang and the cars surrounding me. Simultaneously I was inside trying to steer and control it in accordance with the multiple perspectives I was suddenly given by that part of my mind that was outside. It was like my mind split and one consciousness was inside the car, while the other was zooming all around outside and giving me visual feedback that enabled me to avoid hitting anyone or destroying my Mustang."

HIPPOCAMPAL PLACE NEURONS: ASTRAL PROJECTION

Feelings of fear and terror are mediated by the amygdala, whereas the capacity to cognitively map, or visualize one's position and the position of other objects and individuals in visual-space is dependent on the hippocampus.

The hippocampus contains "place" neurons which are able to encode one's position, place, and movement in space. Specifically, O'Keefe, Nadel, and colleagues, found that hippocampal pyramidal cells were able to become attuned to specific locations within the environment, as well as to particular objects and their location in that environment, thereby creating cognitive maps of visual space. Moreover, they discovered that as the subject moves about in that environment, entire populations of cells would fire but only when in a particular spot, whereas other cells would fire when in a different location.

Some cells respond not just when moving about, but in reaction to the speed of movement, or when turning in different directions. Moreover, some cells are responsive to the movements of other people in that environment

and will fire as that person is observed to move around (Nadel, 2001; O'Keefe, 1976; Wilson and McNaughton, 1993).

The hippocampus, therefore, can create a cognitive map of an individual's environment and their movements and the movement of others within it. Presumably it is via the hippocampus that an individual can visualize themselves as if looking at their body from afar, and can remember and thus see themselves engaged in certain actions, as if one were an outside witness (Joseph, 1996). Indeed, as is well known, the hippocampus play a major role in forming and retrieving memories.

Under conditions of hyperactivation (such as in response to extreme fear) it appears that the hippocampus may create a visual hallucination of that "cognitive map" such that the individual may "experience" themselves as outside their body, observing all that is occurring and/or hallucinate themselves as moving about in that environment such as flying above it.

In fact, it has been repeatedly demonstrated that hyperactivation or electrical stimulation of the amygdala-hippocampus-temporal lobe, can cause some individuals to report they have left their bodies and are hovering upon the ceiling staring down (Daly 1958; Jackson and Stewart 1899; Joseph, 1996, 2014; Penfield 1952; Penfield and Perot 1963; Williams 1956). That is, their ego and sense of personal identity appears to split off from their body, such that they may feel as if they are two different people, one watching from above, the other being observed down below.

As described by Penfield (1952), "it was as though the patient were attending a familiar play and was both the actor and audience."

Presumably abnormal activation due to extreme fear or direct electrical stimulation induces an individual to think they are seeing themselves from afar because the hippocampus is transposing and "hallucinating" one's image; similar to what occurs during normal remembering. Or, perhaps it is not a hallucination at all, but a capacity mediated by a hyperactivated hippocampus.

As noted, many patients who are diagnosed as "clinically dead" and then return to "life" report that after leaving their body they enter a dark tunnel and are then enveloped in a soothing radiant light. The same is reported in the Egyptian and Tibetan Books of the Dead.

Presumably, in that the hippocampus, amygdala, and inferior temporal lobe receive direct and indirect visual input and contain neurons sensitive to

the fovea and upper visual fields, hyperactivation of this region also induces the sensation of seeing a radiant light. The massive release of opiates (due to physical trauma leading to "death") would account for the immediate loss of fear and the experience of tranquillity and joy. Continued activation of these brain regions would also account for the hallucinations of seeing dead relatives, that are commonly reported by those who have "died," as well as the life review, in which one's past life flashes before their eyes.

At death, the amygdala and hippocampus would begin to remember, and memories that were emotional and personal, and all accompanying emotions, such as guilt, would be experienced as part of death. That is, not just the memory, but the awful feeling of the memory would be reexperienced. These structures, therefore, account for the feeling of floating above the body, the life review, and the judgment imposed on the self by their guilty or guilt-free conscience.

The hyperactivation of these limbic structures, therefore, explains why those who have near death experiences report feelings of peace, rapture and joy as they were "bathed by the light" and stood in the all knowing presence of "God" or other divine beings including friends and relatives who had previously passed away. Indeed, these exact same feelings and experiences can be induced by electrically stimulating the inferior temporal lobe and amygdala-hippocampal complex.

EXPERIMENTAL & SEIZURE INDUCED OUT-OF-BODY, HEAVENLY AND OTHER WORLDLY EXPERIENCES

Some individuals suffering from temporal lobe epilepsy also report "out of body experiences." Penfield and Perot (1963) describe several patients who during a temporal lobe seizure claimed they could see themselves in different situations. One woman stated that "it was though I were two persons, one watching, and the other having this happen to me," and that it was she who was doing the watching as if she was completely separated from her body.

One patient had a sensation of being outside her body and watching and observing her body from the outside. Another neurosurgery patient alleged that while outside her body she was also overcome by feelings of euphoria and eternal harmony.

Other patients claim to have quite pleasant auras and describe feelings

such as elation, security, eternal harmony, immense joy, paradisiacal happiness, euphoria, completeness. Between .5 and 20% of such patients report these feelings (Daly 1958; Williams 1956).

A patient of Williams (1956) claimed that his attacks began with a "sudden feeling of extreme well being involving all my senses. I see a curtain of beautiful colors before my eyes and experience a pleasant but indescribable taste in my mouth. Objects feel pleasurably warm, the room assumes vast proportions, and I feel as if in another world."

A patient described by Daly (1958) claimed his temporal lobe seizure felt like "a sunny day when your friends are all around you." He felt dissociated from his body, as if he were looking down upon himself and watching his actions. Williams (1956) describes a patient who during a seizure-induced aura reported that she experienced a feeling of being lifted up out of her body, coupled with a very pleasant sensation of elation and the feeling that she was "just about to find out knowledge no one else shares, something to do with the link between life and death." Subirana and Oller-Daurelia (1953) described two patients who experienced ecstatic feelings of "extraordinary beatitude" or of paradise as if they had gone to heaven. Their fantastic feelings also lasted for hours.

Other patients suffering from temporal lobe seizures have noted that feelings and things suddenly become "crystal clear" or that they had a feeling of clairvoyance, or of having the truth revealed to them, or of having achieved a sense of greater awareness such that sounds, smells and visual objects seemed to have a greater meaning and sensibility. Similar claims are made by those who have "died" and returned to tell the tale.

One woman I evaluated claimed she would float on the ceiling, and could float outside and could see, on one occasion, a friend who was coming up the walkway. She also reported that by having a certain thought, she could propel herself to other locals including the homes of her neighbors.

EMBRACED BY THE LIGHT

"The heavens were opened and the whole creation which is under heaven shone... I saw a light, and a child in the light... And while I looked he became an old man. And he changed his form again... and I saw... an image with multiple forms in the light." -Apocryphon of John.

Betty J. Eadie reports in her 1992 book, "embraced by the light" that after

dying and then communing with three “ancient” men who appeared at her side and who “glowed” she suddenly thought of her husband and children who she wanted to visit. “I began to look for an exit” and discovered that “my spiritual body could move through anything...My trip home was a blur. I began moving at a tremendous speed... and I was aware of trees rushing below me. I just thought of home and knew I was going there... I saw my husband sitting in his favorite armchair reading the newspaper. I saw my children running up and down the stairs... I was drawn back to the hospital, but I don’t remember the trip; it seemed to happen instantaneously” (pp. 33-35).

BLACK ELK

Compare Eadie’s description with that of Black Elk (Neihardt and Black Elk, 1932/1989), a Lakota Sioux Medicine Man and spiritual leader (born in 1863). During a visit to England (he was part of Buffalo Bills Wild West Show) he suddenly fell out of his chair as if dead, and then experienced himself being lifted up. In fact, his companions thought he had died.

According to Black Elk: “Far down below I could see houses and towns and green land and streams... I was very happy now. I kept on going very fast...Then I was right over Pine Ridge. I looked down (and) saw my father’s and mother’s teepee. They went outside, and she was cooking... My mother looked up, and I felt sure she saw me... then I started back, going very fast...Then I was lying on my back in bed and the girl and her father and a doctor were looking at me in a queer way...I had been dead three days (they told him)...and they were getting ready to buy my coffin” (pp. 226228).

This was not Black Elk’s first out of body experience, however. Black Elk demonstrated numerous behaviors and symptoms suggestive of temporal lobe epilepsy. Beginning even in childhood Black Elk repeatedly experienced “queer feelings” and heard voices, had visions, and suffered numerous instances of sudden and terrible fear and depression accompanied by weeping, as well as trance states in which he would fall to the ground as if dead.

Black Elk also had other visions similar to those reporting “life-after-death” experiences, including the following incident that occurred during one of his trance and out-of-body states: “Twelve men were coming towards me, and they said, Our father, the two-legged chief, you shall see... There was a

man standing. He was not Wasichu (white) and he was not an Indian. While I was staring at him his body began to change and became very beautiful with all colors of light, and around him there was light...” (p. 245).

Similar accounts, including descriptions of a tribunal of 12 are detailed in the Egyptian Book of the Dead.

Ms. Eadie (like many others who have experienced “life after death”) came upon a man standing in the light which “radiated all around him. As I got closer the light became brilliant...I saw that the light was golden, as if his whole body had a golden halo around it, and I could see that the golden halo burst out from around him and spread into a brilliant, magnificent whiteness that extended out for some distances” (pp. 40-41).

ASTRAL ANTIQUITY

Muhammed reports that while sleeping and dreaming he was lifted into the air and transported by the angel Gabriel from Arabia to the Temple Mount in Jerusalem. There he was greeted by three men, who he believed to be Abraham, Moses, and Jesus, as well as a crowd of other prophets. He was then lifted up and entered a divine sphere and came upon the garden of promise and, according to the Koran, saw a “lote-tree veiled in a veil of nameless splendor.”

In Hinduism, the lote tree symbolizes the limit of this reality and rational thought.

St. Augustine reports he was “lifted up by an ardent affection towards eternal being itself... we climbed beyond all corporate objects and the heaven itself, where sun, moon, and stars shed light on the earth.”

Some individuals (and their followers) claim to be able to voluntarily leave their body (Monroe, 1994), this includes any number of “mystics,” and New Age spiritualists, as well as some priests, prophets and shamen. Indeed, Monroe (1994) founded an Institute to study this phenomenon, and claims that others can learn this technique. Monroe, however, notes that when he had his first out-ofbody experience he had felt extremely frightened.

That so many people, regardless of culture or antiquity, have similar experiences (or hallucinations) while in trance states, or dreaming, or after “dying,” of leaving their body, is presumably due to all possessing a limbic system and temporal lobe that is organized similarly.

The fact that although ostensibly similar, many of these experiences are

also colored by one's cultural background, can in turn be explained by differences in experience and cultural expectations and thinking patterns. As explained in the Tibetan Book of the Dead: "It is quite sufficient for you (the deceased) to know that these apparitions are [the reflections of] your own thought forms."

DEATH AND THE LIMBIC SYSTEM

Presumably conditions such as dreaming, trance states, depth electrode activation, extreme fear, traumatic injury, or temporal lobe epilepsy, result in hyperactivation of the amygdala and hippocampus and overlying temporal lobe. These structures create an image of the individual floating or even soaring above familiar or bizarre surroundings, and will trigger memories, hallucinations, brilliant lights, as well as secrete opiate-like neurotransmitters which induce a state of euphoria and thus eternal peace and harmony.

Given that similar experiences are reported by those who have experienced depth electrode stimulation of these structures, and by those declared "clinically dead" also raises the possibility that the hippocampus and amygdala may be the first areas of the brain to be effected by approaching death, as well as one of the last regions of the brain to actually die.

That is, as one approaches death and even after medical death, the amygdala and hippocampus may continue to function briefly and not only become hyperactivated, but produce a feeling of eternal peace and tranquillity and a hallucination of floating outside the body and of meeting relatives and other religious figures; like a dream.

And yet, it is curious that so many individuals have basically a very similar "dream" and only under conditions of death. Moreover, it is exceedingly difficult to reconcile these experiences with the Darwinian notion of evolution.

What is the "evolutionary" adaptive significance of so many members of the human race having a dream of the "Hereafter" after they die.

As we have learned from physics, this reality is only one of many, and the perception of these alternate realities, and all associated manifestations of extraordinary psychic abilities, are normally inhibited, suppressed, and cannot be perceived or processed due to the limitations of our brain. Under conditions of hyperactivity, the limbic system may not only hallucinate, it may also begin to process this information, and gain access to and engage in

alternate modes of thinking, perceiving, and communicating, such that what is normally concealed is revealed to the receptive mind.

DREAMS, SPIRITS AND THE SOUL

Dreams and hallucinations, have, as their neurological source, activity generated within the temporal lobe and limbic structures buried within--the hippocampus and the amygdala. The hippocampus is known to be a depository of new memories and to assist in the retrieval of new memories-memories that often reappear in the contexts of dreams. Yet, dreams and memories, especially emotional memories, also have as their neurological source, the amygdala and overlying temporal lobe and associated limbic structures.

The amygdala enables us to hear "sweet sounds," recall "bitter memories," or determine if something is spiritually significant, sexually enticing, or good to eat. The amygdala also makes it possible for us to store personal, sexual, spiritual, and emotional experiences in memory and to recall and reexperience these memories when awake or during the course of a dream in the form of visual, auditory, or religious or spiritual imagery (Bear 1979; d'Aquili & Newberg 1993; Gloor 1986, 1992, 1997; Halgren, 1992).

The amygdala, in conjunction with the hippocampus, contributes in large part to the production of very sexual as well as bizarre, unusual and fearful mental phenomenon including out-of-body dissociative states, feelings of depersonalization, and hallucinogenic and dreamlike recollections involving threatening men, naked women, sexual intercourse, religion, the experience of god, as well as demons and ghosts and pigs walking upright dressed as people (Bear 1979; Daly 1958; d'Aquili & Newberg 1993; Gloor 1986, 1992; Halgren 1992; Horowitz et al., 1968; Jaynes 1976; MacLean 1990; Mesulam 1981; Penfield & Perot 1963; Rolls, 1992; Schenk & Bear 1981; Slater & Beard 1963; Subirana & Oller-Daurelia 1953; Taylor, 1972, 1975; Trimble, 1991; Weingarten et al., 1977; Williams, 1956).

The amygdala also makes it possible to experience not just spiritual and religious awe, but all the terror and dread of the unknown. Indeed, the amygdala can generate feelings of hellish, nightmarish fear

And yet, it is also the amygdala which is responsible for the capacity to transcend the known, this reality. It is also the amygdala which assists in maintaining this reality through the inhibition and filtering of most of the

sensory signals bombarding the brain and body. If not for this sensory filtering, a color might have taste and its own particular texture, whereas sounds might provoke smells, warmth, light, colors, tastes, and feelings of weight. Hyperactivation of the amygdala, and overlying temporal lobes can remove these sensory filters, and what is concealed is revealed, sometimes in overwhelming confusing majesty.

Neurosurgical patients have reported communing with spirits or receiving profound knowledge from the Hereafter, following depth electrode amygdala stimulation or activation (Penfield and Perot 1963; Subirana and Oller-Daurelia, 1953; Williams 1956). Some have reported hearing even the singing of angels and the voice of "God."

THE LIMBIC SYSTEM: SPIRITUALITY AND EMOTION

According to d'Aquili and Newberg (1993) mystical states may be voluntarily or involuntarily induced and are dependent upon the differential stimulation of limbic system nuclei, including the hypothalamus, hippocampus, and amygdala, as well as the right frontal and right temporal lobe. However, it appears that these brain areas differentially contribute to religious and emotional experience.

For example, the hypothalamus is concerned with all rudimentary aspects of emotion, homeostasis such as food and water intake, and controls the hormonal and related aspects of violent behavior and sexual activity. The amygdala also plays a highly significant role in sexual and violent behavior, and, in conjunction with the temporal lobe and hippocampus, enables a human to have religious, spiritual and mystical experiences (Bear 1979; Daly 1958; d'Aquili and Newberg 1993; Horowitz et al. 1968; Mesulam 1981; Penfield and Perot 1963; Schenk, and Bear 1981; Slater & Beard 1963; Subirana & Oller-Daurelia 1953; Trimble 1991; Weingarten, et al. 1977; Williams 1956). These religious experiences may involve violent behavior or sexual activity, due to limbic involvement.

As we shall see in later chapters, many religious customs and rituals involve violence and sexuality, which in turn is due to the activation of this limbic system transmitter to god.

The amygdala and hypothalamus subserve the capacity to experience feelings of intense sexual arousal, fear or, conversely, euphoria, including an orgasmic feeling of rapture, or the "nirvana" of a heroin "high." This is

because the hypothalamus and amygdala are major pleasure centers, and contain opiate-producing neurons and opiate (enkephalin) receptive neurons, thus generating feelings of numbness and a narcotic high. Large concentrations of opiate receptors and enkephalin-producing neurons are located throughout the amygdala (Atweh & Kuhar 1977ab; Uhl et al., 1978).

In response to pain, stress, shock, fear, or terror, the amygdala and other limbic nuclei begin to secrete high levels of opiates which can eventually induce a state of calmness as well as analgesia and euphoria (Joseph, 1998a, 1999a). It is this heroin high that explains why an ox, deer, and other animals will simply give up and lie still while they are devoured and eaten alive. It is this amygdalainduced heroin high which also contributes to feelings of religious rapture and the ecstasy associated with life after death and the attainment of Nirvana.

THE AMYGDALA, HIPPOCAMPUS AND HALLUCINATIONS

Whereas the amygdala and hypothalamus interact in regard to pleasure, rage, and sexuality, the amygdala and hippocampus interact to subserve and mediate wholly different aspects of experience, including memory, dreaming, and hallucinations. The hippocampus in particular appears to be responsible for certain types of "hallucinations" such as the visualizations of astral projection or seeing oneself floating above the body (Joseph 1996, 1999b, 2000a). Some patients report not only floating, but of being embraced by a light and taken to a vast realm of fantastic proportions where they are given access to knowledge of the nature of life and death.

The amygdala, hippocampus, and temporal lobe are richly interconnected and appear to act in concert in regard to mystical experience, including the generation and experience of dream states and complex auditory and visual hallucinations, such as may be induced by LSD (Broughton 1982; Goldstein et al. 1972; Gloor 1986, 1992; Hodoba 1986; Horowitz, et al. 1968; Joseph, 1992a; Meyer et al. 1987; Penfield and Perot 1963; Weingarten, et al. 1977; Williams 1956). If these neurons are hyperactivated, such as occurs during dream states, seizures, physical pain, terror, food deprivation, social and sensory isolation, and under LSD (which disinhibits the amygdala by blocking serotonin) an individual might infuse their perceptions with tremendous religious and emotional feeling. Hence, under these conditions the individual may hallucinate, and ordinary perceptions, objects or people

may be perceived as spiritual in nature or endowed with special or religious significance.

Intense activation of the temporal lobe, hippocampus, and amygdala has been reported to give rise to a host of sexual, religious and spiritual experiences; and chronic hyperstimulation can induce an individual to become hyper-religious or to visualize and experience ghosts, demons, angels, and even "God," as well as claim demonic and angelic possession or the sensation of having left their body (Bear 1979; Gloor 1986, 1992; Horowitz et al. 1968; MacLean 1990; Mesulam 1981; Penfield & Perot 1963; Schenk & Bear 1981; Williams 1956).

In some instances the individual may come to believe he or she is hearing, seeing, and interacting with gods, angels and demons when in fact they are hallucinating. These false beliefs are accentuated further because they are excessively emotionally and religiously aroused and are experiencing an "enkephalin" high and feelings of rapture or "nirvana."

In many cases, however, the individual is not hallucinating. Rather, their eyes have been opened, and they suddenly see as gods... knowing good and evil.

LSD, LIMBIC SYSTEM FILTERING AND HALLUCINATIONS

The amygdala is capable of processing visual, tactile, auditory, gustatory, olfactory, and emotional stimuli simultaneously. Amygdaloid neurons are multimodally responsive. Single amygdaloid neurons receive a considerable degree of topographic input, and are predominatly polymodal, responding to a variety of stimuli from different modalities simultaneously.

Normally much of this data is suppressed and filtered so as to prevent the tasting of colors, the visualization of sound, and so on. This is made possible via the inhibitory influences of the frontal lobes and a variety of neurotransmitters including serotonin (5HT). 5HT suppresses synaptic activity in the amygdala and throughout the neocortex and thus reduces sensory input (Curtis & Davis 1962; Marazzi & Hart 1955; Morrison & Pompeiana 1965). 5HT restricts perceptual and information processing and in fact increases the threshold for neural responses to occur at both the neocortical and limbic level. In this manner, selective attention (via sensory filtering) can be maintained while the organism is engaged in goal directed

motor behavior, such as running away or taking evasive action if chased by a lion.

In consequence, substances which block 5HT reception at the level of the synapse -such as LSDresults in increased activity in the amygdala and in the sensory pathways to the neocortex (Purpura 1956), such that information that is normally filtered out is perceived. Following the administration of LSD high amplitude slow waves (theta) and bursts of paroxysmal spike discharges occurs in the hippocampus and amygdala (Chapman & Walter, 1965; Chapman et al. 1963), and the amygdala begins to process information that is normally suppressed.

Under conditions which induce limbic hyperactivity, 5HT may be depleted and limbic sensory acuity is increased. However, what is perceived is not necessarily a hallucination but instead represents the perception of overlapping sensory qualities that are normally filtered out. Colors may be felt and tasted, music may be observed as well as heard, the molecular composition of ceilings, floor and walls may be parted so that one can see through the spaces between where molecules join together. And the pulse of life may be experienced as it ebbs and flows in a leaf one holds between their finger tips.

Consider, for example, a description of someone's first LSD "trip:"

"It was 1966... Jimi Hendrix was singing about purple haze, and that is exactly what we scored up in Haight Ashbury—mixed by the master himself, Stanley Osley..."

"About half an hour after I'd taken it, I was walking toward the park to meet and trip with my fellow tripsters when I began to notice the incredible clarity and vividness of my surroundings. Colors were brighter, plants seem to sparkle...and I stopped and touched a leaf...I could feel its energy, its life... I could taste it through my fingers...And when I got to the park I was so overwhelmed with the colors, the tastes, the smells, the incredible vividity and clarity that I felt almost overwhelmed and sat down to take it all in..."

"And then I heard a jet somewhere in the distance, and I looked into the sky but couldn't see it but my ears led my eyes to one of the mountains surrounding the valley, and oh my god, I could see right through the mountain. It was like the molecular composition of the mountain was parting into separate molecules. I could see the spaces between the molecules which were all in a frenzy of activity... it was as if I had achieved X-ray vision, and

there were these crystal blue holes—like bubbles—and I could see right through the mountain and I could see the sky on the other side, including the jet. I could see the jet on the other side of the mountain by looking right through the mountain, by looking right through those gaps in the spaces between the molecules which were zipping along in their own unique pattern. And then the jet flew over the top of the mountain and instead of one jet I could see ten, then a hundred, and a kaleidoscope of jets in the sky."

"I raised my hand to point to this incredible sight, and instead of one hand, there were these trails of hands. And I did that again, waved my hand and there were these hand-arm trails of handshands-hands catching up and then merging... and it was then that I realized I could see through my hand. So I gazed at it for closer inspection. It was as if my eyes became a tunneling microscope—and this was 10 years before they invented tunneling microscopes."

"At first I could see the incredible cellular structure of the skin, and then the molecular structure...the pulsating molecules themselves... and then I could see between the spaces where the molecules joined together... my sight penetrated the skin and I could see the blood vessels, and then my eyes penetrated the blood vessels and I could see inside the blood vessel, I could see the blood platelets and the white corpuscles as they swirled through the vessel—and I kept thinking: How come I never noticed this before? I had forgotten that I had taken LSD."

Hallucinogens, of course, are an age-old means of obtaining access to alternate realities, including the realities of "god." Hallucinogens are said to enable an individual to peer between the space that separate this reality from all other realities, such that what is concealed is suddenly revealed. It is the amygdala, hippocampus, and temporal lobe which are responsible for these complex hallucinations, and it is the amygdala which normally filters much of this information so that it remains hidden. Hence, by hyperactivating these structures, in essence, one is also activating the transmitter to god.

SOULS, SPIRITS, DREAMS, AND POLTERGEISTS TO KNOW FEAR IS TO KNOW GOD

"Fear the Lord your God." -Deuteronomy 10:12.

Priests, prophets, shamans and many others who encounter "god" or His "angels" not uncommonly experience tremendous fear. Fear is the most

common emotion associated with the amygdala (Gloor, 1997; Halgren, 1992; LeDoux, 1996; Williams, 1956), with some patients experiencing horrifying, hellish, and nightmarish fear, sometimes coupled with hellish hallucinations.

We are repeatedly told in the Bible, that to know fear is to know god. Indeed, even a committed atheist may feel compelled to cry out and pray to god if sufficiently terrified. Terror is also an emotion associated with the amygdala... as well as with the Lord God.

Yet others experience awe and rapture when confronted by the divine. As noted, amygdala hyperactivation is also associated with feelings of extreme joy and ecstasy.

According to d'Aquili and Newberg (1993; p. 194) "a combination of the experience of both fear and exhalation" is "usually termed religious awe." These feeling states are "almost always associated with religious symbols, sacred images, or archetypal symbols" which flow "from the inferior temporal lobe" and which "appear sometimes as monsters or gods". Indeed, angels, demons, and poltergeists may be experienced.

Most people find these experiences quite terrifying. They also frequently believe their perceptions are completely real and are not hallucinations.

SPIRITS AND POLTERGEISTS

"Cindy," a 22 year old college student, was plagued by demons and ghosts for months until her abnormal right inferior temporal lobe was surgically removed.

Prior to her brain injury, Cindy had never been very religious, and had certainly never seen a ghost; that is, until following her auto accident. She had been thrown over 50 feet through the windshield of her car and suffered a fracture of the right temporal region of the skull and developed a subdural hematoma, a blood clot, which was pressing on the temporal lobe inducing herniation. Burr holes were drilled into her skull and the clot was surgically evacuated. Although her brain and temporal lobe had been injured, over the following weeks she seemed to quickly recover.

It was several days after her release from the hospital when she was startled while watching television. The arms, legs, hands, feet, and heads of the various actors began protruding from the screen into the living room where she sat.

Cindy said that at first she thought the television was broken and turned it

off. But, as she stared back at the blank screen she saw what looked like her dead father staring back at her (which was probably her own reflection). As she backed away, the figure emerged from the television. He beckoned to her, and then behind him ghostly spooks and wraiths began to stream from the picture tube.

Terrified and crying for her mother she raced for the bathroom and locked herself in. Yet, even as she hid within the inner sanctum of the washroom, spirits, sprites and poltergeists streamed from the bathroom mirror and swirled about her. Crying and stumbling, she raced into the living room and was horrified to see a spirit enter and take possession of her mother who was transformed before her eyes. Panicked and terrified, Cindy ran into the street crying for help. A police officer, after investigating the scene, brought her to the local hospital and psychiatry unit. She was medicated and kept there on a 72 hour hold.

Later she decided what she had experienced were ghosts and lost souls of people who had been buried in an old, almost completely forgotten cemetery on the other side of the hill from where she lived. She also thought they were the ghosts of Indians who had been entombed beneath her house as there are numerous Indian burial grounds in the county.

Once she was released from her 72 hour psychiatric hold, she stopped taking her medication, and over the course of the next several weeks, she claimed to see "animal spirits." She reported that the "secret souls" of her mother's house plants were watching and observing her and that she could sometimes see filmy, soul-like entities traveling to and fro across the room and between different plants.

After several more hospitalizations, and an EEG, it was determined that she was suffering from excessive activity, seizure activity in the damaged temporal lobe. The inferior temporal lobe and the underlying amygdala were surgically ablated and destroyed, and she ceased to "hallucinate."

DREAMS, ANIMAL SPIRITS AND LOST SOULS

Across time and culture, people have believed that not just humans and animals, but plants and trees were sensitive, sentient, intelligent, and the abode of spirits including the souls of dead ancestors (Campbell 1988; Frazier 1950; Harris, 1993; Jung 1964; Malinowski 1948). Before felling a tree, the spirit sometimes had to be conjured forth so as to not harm it

(Campbell 1988; Frazier 1950). Be it animal or plant, souls were also believed capable of migrating to new abodes.

Among the ancients and many so called primitive cultures, it was believed that souls are reflected in shadows, in streams, and pools of water (Campbell, 1988; Frazier, 1950; Harris, 1993; Jung, 1964; Malinowkski, 1948). Because ghosts or demons sometimes attempt to abduct souls, this required that one's shadow and reflection be protected. Even water spirits might try to capture a person's soul, so staring into reflecting ponds and lakes was to be avoided.

Moreover, the ancients believed that the shadows and reflections of others had to be avoided so that one did not come into contact with the soul of a witch, sorcerer, or a demon. It was believed that one's soul could be abducted by demons and witches as well as the recently departed. This is also why in some cultures people turn mirrors to the wall after a death and lay down pictures of the recently departed (Frazier 1950). This insures that living souls are not stolen by the souls of the dead who are leaving this world for the next one.

The belief in the persistence of the soul after death gave rise to ancestor worship in some ancient cultures, including China. Oracle Bones were believed to contain the souls of the dead and were employed for divinatory purposes in ancient China over 4,000 years ago. The earliest Oracle Bones so far discovered are covered with pictograms including a man with a large ghostly distorted head (Brandon, 1967). This pictogram also denotes the word kuei, which means, soul. Oracle bones also included characters signifying the words "she, shen, and tsu." "Tsu" means dead ancestor, "she" is a protective fertility deity of the soil, and "shen" are divine beings connotating phallic significance.

The ancient Chinese practiced a religious ritual which was intended to prevent the soul from departing the body at death. The orifices would be stopped up to keep the kuei safely inside the body. So long as the soul remained tethered to the body, the body would not undergo its final fatal disintegration. These beliefs gave rise to the ritual of "calling back of the soul," a ritual also performed for the living as the souls were believed able to wander forth from the body, such as during sleep, exposing the living body to death and extinction (Brandon, 1967).

The ancient Chinese believed that the kuei represented by the yin-soul, was associated with the body since conception. By contrast, a yang-soul was

associated with the individual personality and the person's unique mental qualities.

The alternating and competing principles of the yin-soul and the yang-soul are directly related to the concepts of ying and yang. They also gave rise to ancestor worship as the ancient Chinese believed that the life force, the energy associated with the soul, this substance familiale, lay buried beneath the ground as une masse indistincte. "This energy was represented above ground at any given moment, only by the living members of the family, which constituted the individualized portions of that substance familial. It followed, accordingly, that each birth within the family represented the reincarnation of a portion of that subterranean substance familial, while each death meant the return of a part of this individual family substance familial to the masse indistincte in the ground below" (Brandon, 1967, p. 180).

SOULFUL DREAMS

Souls were also believed by ancient humans to wonder about while people sleep and dream (Brandon 1967; Frazier 1950; Harris 1993; Jung 1945, 1964; Malinowkski 1990). That is, among many different cultures and religions the soul is believed to sometimes escape the body via the mouth or nostril during sleep. Moreover, during a dream the soul may wonder away from the body and may engage in certain acts or interact with other souls including those of the dear but long dead and departed.

Sometimes the soul is believed to take on another form, such as a bird, or deer, fox, rabbit, wolf, and so on. The spirit and the soul could also hover about in human-like, ghostly vestiges, at the fringes of reality, the hinterland where day turns into night (Campbell 1988; Frazier 1950; Jung 1964; Malinowski 1954; Wilson 1951). The souls of animal's such as a wolf or eagle, could also leave the body and take on various forms including that of a woman or Man. Not just men but animals too had souls that had to be respected.

Even after death souls continued to interact with the living, and every living being possessed a soul. Hence, the ancients believed that these souls could be influenced, their behavior controlled, and, in consequence, a good hunt insured or with the assistance of a soul, or by performing magical rituals aimed at the soul, enemies could be defeated and an evil man could be easily slain.

Because animals and plants had souls, and as some gods would also take up residence within an animal or plant as a temporary or permanent abode, this gave rise to animal worship and animal sacrifice, as well as the avoidance of certain animals or plants which were not to be killed or eaten, or killed or eaten only in a certain ritualized manner (Campbell 1988; Frazier 1950; Malinowkski 1948; Smart 1969).

Over the course of human cultural and cognitive evolution, these beliefs became increasingly complex and required specialists to interpret and minister the rituals and rites (Armstrong 1994; Brandon 1967; Campbell 1988; Frazier 1950; Smart 1969; Wilson 1951). Soon priests, prophets, and even the Gods evolved.

DREAMING OF GOD

Priests and prophets as well as the common people, often experienced God as well as animal spirits and the souls of the dead, during the course of a dream (Campbell 1988; Frazier 1950; Jung 1945, 1964; Malinowkski 1954).

Dreams have their source in the amygdala and hippocampus and inferior temporal lobe. Although mediated by brainstem nuclei, activity within the amygdala may in fact trigger the first phase of dreaming (REM), which is signified by the buildup of PGO (pontine-geniculate-occipital) waves. REM (dream) sleep is heralded and then accompanied by what has been referred to as PGO waves. That is, the amygdala is active not only during REM, but amygdala activity triggers PGO waves (Calvo, et al. 1987) which then leads to dream sleep. The amygdala produces the dream, and dreams the dream, and the dream may consist of fragmentary memories, hallucinatory imagery, and emotional extremes.

In addition to amygdala activity during REM, the hippocampus begins to produce slow wave, theta activity. Presumably, during REM, the hippocampus and amygdala act as a reservoir from which various memories, images, emotions, words, and ideas are drawn and incorporated into the matrix of dreamlike activity being woven by the right (and left) hemisphere (Joseph 1982, 1988, 1996, 2014a). The hippocampus and amygdala also serve as a source from which material is drawn during the course of a daydream.

Yet, as also noted, these limbic structures also normally acts to inhibit the perception of most of the stimuli impinging on the body. This information is

filtered so that one reality is maintained and to prevent the individual from being overwhelmed with competing streams of input. In other words, just as a channel selector on a television or radio permits the select reception of information from a single source (a single reality), these brain structures perform likewise. However, just as there are a multitude of channels, and just as one can change from channel to channel in order to receive a wealth of data, images, sounds, and information from a variety of sources (a variety of realities), likewise, the limbic system can also become tuned to other sources of information which are not normally perceived.

And, once the Doors of Perception are opened, all appears as it is...infinite.

DREAMING & WITCHCRAFT

"Witchcraft" and any and all "paranormal" capabilities, including "ESP" or divining by dreams, has been condemned as "unnatural" by many (but not all) religions throughout the ages including the ancient Jews and the Catholic Church.

"Witchcraft is a sin." I Samuel 15: 23

Of course, the "god" Yahweh would communicate with his prophets through visions and dreams. However, the unauthorized use of these same capacities was also condemned and outlawed, and those possessing these "unnatural" attributes killed: "I will gather you and blow upon you the fire of my wrath, and ye shall be melted in the midst therefore... for... They prophesy falsely and divine deceitfully. They have profaned what is sacred to me... I am profaned in their midst" (Ezekiel, 22:23).

The Lord God declared religious war against and condemned to death all witches and all those who could commune with the dead, speak with spirits, conjure ghosts, or communicate with devils (Exodus 22: 18, Samuel 15: 23; Ezekiel 22:23).

"You know... how he has cut off those familiar with ghosts and spirits and wizards. So wherefore then layest thou a snare for my life, to cause me to be killed." -I Samuel 28:8-10.

Likewise, the Medieval Catholic Church burnt witches, warlocks, and dreamers, and all those suspected of communing with devils. According to Church and religious authorities, these practices were the work of the Devil, Satan, the fallen angel, the fallen god, the serpent also known as the god of

the snake.

These “supernatural abilities” were viewed as a threat for they could be employed to divine the future, to influence and cast spells on other humans, or to communicate with the dead or even with other gods including the devil. Hence, those who saw the future through trance states or via dreams, or who demonstrated what might be described as “ESP,” although venerated by some, were condemned by others as “unnatural” and sinful.

“Thou shall not suffer a witch to live.” Exodus 22:18

DREAMS AND MULTIPLE REALITIES

It is via dreams that gods and spirits speak to women and men (Campbell, 1988; Jaynes, 1976; Jung, 1945, 1964). It was via dreams that hunter-gatherers and ancient humans were able to gain access to the domicile of the soul and the spirit world of the hereafter (Frazier 1950; James 1958; Neihardt and Black Elk1989). Indeed, it has been argued that dreams (and thus the limbic system) enable an individual to come into contact with a different reality; the same reality shared and experienced by our ancestors and the gods —the ultimate reality of the Great Spirit.

Our ancient human ancestors lived in two realities, that of the physical and of the spiritual, both of which were undeniable and experienced by enemies and friends alike (Frazier, 1950; Jung, 1945, 1964). One need only spend a night alone in the forest among the trees and the elements to become quickly convinced that one is not alone, but is being watched by various entities both alive and supernatural, animal and spirit, benevolent and unkind.

Like modern day humans, the ancients had dreams by which they were transported or exposed to a world of magic and untold wonders. It is as if one had been transported to a different world and a reality which obeyed its own laws of time, space, and motion.

It is through dreams that humans came to believe the spiritual world sits at the boundaries of the physical, where day turns to dusk, the hinterland of the mind where imagination and dreams flourish and grow (Frazier, 1950; Jung, 1945, 1964; Malinowkski, 1954); hence the tendency to bury the dead in a sleeping position even 100,000 years ago.

It is also via dreams that humans came to know that spirits and lost souls populated the night. The dream was real and so too were the Gods and demons who thundered and condemned and the ghosts and phantoms that

hovered at the edge of night. Although but a dream, like modern humans, our ancient ancestors experienced this through the senses, much as the physical world is experienced. Both were real and were taken seriously.

Dreams are the royal road to the unconscious realms of the mind and to realities that lie just beyond conscious awareness. And it is through the amygdala, hippocampus, and temporal lobe, that dreams emerge and flow. The limbic neurons subserving spiritual experiences also give rise to dreams. Thus the link between the world of dreams and the spirit land of gods and demons is the limbic system; i.e. the "transmitter to god."

RIGHT TEMPORAL LOBE HYPERACTIVATION & DREAMING

The amygdala and the neocortex of the temporal lobe are interactionally involved in the production of religious and hallucinatory experiences including dream states (Broughton, 1982; Gloor, 1997; Goldstein et al., 1972; Hodoba, 1986; Humphrey & Zangwill 1961; Kerr & Foulkes 1978; Meyer et al., 1987); the right temporal lobe and amygdala in particular (Joseph, 1988a, 1992a).

Similarly, d'Aquili and Newberg (1993) argue that the right hemisphere (and right amygdala) is more involved than the left in the reception and production of religious imagery. This is likely as the right hippocampus and amygdala, and the right hemisphere in general (Broughton, 1982; Goldstein et al., 1972; Hodoba, 1986; Humphrey & Zangwill 1961; Joseph, 1988, 2000a; Kerr and Foulkes 1978; Meyer, Ishikawa, Hata, and Karacan 1987) also appear to be involved in the production of hallucinations, dream imagery as well as REM during sleep. Indeed, like the limbic system, the right hemisphere is not only associated with dreams, but the unconscious mind (Joseph, 1982, 1988a,b).

In addition to dream production, the right hemisphere also appears to be the dominant source for complex non-linguistic hallucinations. Specifically, tumors or electrical stimulation of the right hemisphere or temporal lobe are much more likely to result in complex visual as well as musical and singing hallucinations, whereas left cerebral tumors or activation gives rise to hallucinations of words or sentences (Berrios, 1990; Halgren, et al. 1978; Hecaen & Albert, 1978; Jackson, 1880; Mullan & Penfield, 1959; Penfield & Perot, 1963; Teuber et al. 1960).

Although up to five stages of sleep have been identified in humans, for

our purposes we will be concerned only with two distinct sleep states. These are the REM (rapid eye movement) and nonREM (N-REM) periods. N-REM occurs during a stage referred to as “slow-wave” or synchronized sleep. In contrast, REM occurs during a sleep stage referred to as “paradoxical sleep.” It is called paradoxical, for electrophysiologically the brain seems quite active and alert, similar to its condition during waking. However, the body musculature is paralyzed, and the ability to perceive outside sensory events is greatly attenuated (reviewed in Hobson et al. 1986; Steriade & McCarley 1990; Vertes 1990).

Most individuals awakened during REM report dream activity approximately 80% of the time. When awakened during the N-REM period, dreams are reported approximately 20% of the time (Foulkes, 1962; Goodenough et al. 1959; Monroe et al. 1965). However, the type of dreaming that occurs during REM vs. N-REM is quite different. For example, N-REM dreams (when they occur) are often quite similar to thinking and speech (i.e. lingusitic thought), such that a kind-of rambling verbal monologue is experienced in the absence of imagery. It is also during N-REM in which an individual is most likely to talk in his or her sleep. In contrast, REM dreams involve a considerable degree of visual imagery, emotion, and tend to be distorted and implausible to various degrees.

REM is characterized by high levels of activity within the brainstem, occipital lobe, and other nuclei (Hobson, et al. 1986; Steriade & McCarley 1990; Vertes 1990). It also has been reported that electrophysiologically the right hemisphere becomes highly active during REM, whereas, conversely, the left half of the brain becomes more active during N-REM (Goldstein et al. 1972; Hodoba, 1986). Similarly, measurements of cerebral blood flow have shown an increase in the right temporal and parietal regions during REM sleep and in subjects who upon wakening report visual, hypnagogic, hallucinatory and auditory dreaming (Meyer et al., 1987).

Electrophysiologically the right temporal lobe becomes highly active during REM, whereas, conversely, the left temporal region becomes more active during dreamless sleep, i.e., NREM (Goldstein et al. 1972; Hodoba 1986). Similarly, measurements of cerebral blood flow have shown an increase in the right temporal regions during REM sleep. Right temporal lobe blood flow also increases in subjects who upon wakening report visual, hypnogogic, hallucinatory and auditory dreaming (Meyer et al. 1987).

Abnormal and enhanced activity in the right temporal and temporal-occipital area will also provoke dreaming and acts to increase the length and amount of dreaming and REM sleep for an atypically long time (Hodoba 1986).

Interestingly, abnormal and enhanced activity in the right temporal and temporal-occipital area acts to increase dreaming and REM sleep for an atypically long time period. Similarly, REM sleep increases activity in this same region much more than in the left hemisphere (Hodoba, 1986), which indicates that there is a specific complementary relationship between REM sleep and right temporaloccipital electrophysiological activity.

As noted, LSD induces its "hallucinatory" effects by disinhibiting the amygdala. That is, LSD blocks the sensory filtering and perceptual inhibitory activity of a neural transmitter, serotonin. In consequence multisensory qualities that are normally suppressed are suddenly perceived such that what was hidden is revealed; sounds have color and colors and sounds can be tasted, as the boundaries of this reality melt away thus revealing the supernatural reality of the otherside.

Conversely, LSD induced hallucinations are significantly reduced when the right but not the left temporal lobe has been surgically ablated (Serafintides1965). Similarly, it has been reported that dreaming is abolished with right but not left temporal lobe destruction (Bakan, 1978). Hence, it appears that there is a specific complementary relationship between REM sleep, hallucinations, LSD, mystical experiences, and right temporal (and thus right amygdala and hippocampus) electrophysiological activity. By contrast, the left half of the brain appears to be the domain of the more logical and nonintuitive aspects of conscious experience.

Whereas the right hemisphere is dominant for all aspects of emotion, and is the domain of the more visual and imaginal aspects of the mind, the left hemisphere is dominant for language, math, and the temporal sequential aspects of consciousness. It is the right hemisphere which dreams the dream, and it is the left hemisphere which not only passively observes but which forgets the dream upon waking (Joseph, 1988a). It is the more unconscious realms associated with the right hemisphere which are directly in tune with these alternate realities, such as conveyed through dreams, and it is the left hemisphere which dismisses and rationally explains away these experiences as nonsense.

DAY DREAMS AND FORESEEING THE FUTURE

During dream states we see and experience events which are normally filtered from the conscious mind. We can also gain insight into problems which have plagued us, or gain access to knowledge of events which occurred in the past or which will occur in the future (Joseph, 1988a, 2000a; Jung 1945, 1964)—just as we can think about the future or the past and make certain deductions and predictions.

Consider the day dream. In addition to its images and memories, the fantasy produced also consists of anticipations regarding the future, and in this respect, the day dream could be considered an imaginal means of preparation for various possible realities. Interestingly, daydreams appear to follow the same 90-120 minute cycle that characterize the fluctuation between REM and NREM periods, as well as fluctuations in mental capabilities associated with the right and left hemisphere (Broughton 1982; Kripke and Sonneschein 1990). That is, the cerebral hemispheres tend to oscillate in activity every 90-120 minutes. This cycle corresponds to the REM-NREM cycle and the appearance of day and night dreams, and the right hemisphere also appears to be the source of day dreams.

According to the ancients, day and night dreams both contained important information, not just regarding the past or the world of souls and spirits, but the future. As possible harbingers of the future, the intentions of the gods, and the future of self, friends and family, it has long been believed that dreams should be observed most carefully and could be used to foretell the future (Campbell 1988; Frazier 1950; Freud 1900; Jung 1945, 1964; Malinowkski 1954). It was pharaoh's dream which foretold that seven years of famine would follow seven years of plenty.

In fact, among the ancients, the American Indians, and even the highly cultured Romans, every once in a while someone would have what is called "a big dream." The big dream was of great importance to the whole clan, tribe, city, or nation. Often, the man or woman having the dream would gather the others together and announce it. And more often than not, it would be a woman who would have the big dream, for women have always been said to be more in touch with the "irrational," and throughout history it is women who have predominantly served as oracles.

Because the limbic system and right temporal lobe are hyperactivated during dream states, not only does the brain become freed of inhibitory

restraint, but one is presumably able to gain access to dreamlike alternate realities, including, perhaps, the spiritual reality of the Hereafter. Presumably the same occurs when fasting, isolated, in pain, under LSD, in trance, or in the throes of religious ecstasy, all of which activates the limbic system thus increasing channel capacity, so that what is concealed is revealed.

The Evolution of Dream Consciousness

That so many people, regardless of culture or antiquity, have similar dreams and hallucinations, is presumably due to all possessing a limbic system and temporal lobe that is organized similarly. Of course, many of these experiences are also colored by one's cultural background and differences in thinking patterns.

However, we should ask: is it really a hallucination if someone experiences a dissociation of consciousness and floats above their body and can later accurately described what was taking place and the appearance of those around them? Is it really a hallucination if an individual can see inside his hand and watch the blood cells swishing through his blood vessel? If one of the great presidents in the history of the United States dreams of his death 13 days before he is assassinated, was it just a dream?

There are numerous reports of individuals who claim to have dreamed about future events which then took place, including deaths, tragedies, mass murders, horrific accidents, and environmental catastrophes (Barker 1967; Jung 1945, 1964; Wiseman 2011). Yet, given that six billion people dream multiple dreams every night, it could be argued that we should not be surprised that a few of these dreams just happen to accurately coincide with what takes place. These are just chance coincidences, which, when considering the billions of dreams dreamed nightly, should be dismissed as meaningless and of no significance (Wiseman 2011). Since so few people have these dreams, it should not be concluded that these dreams represent an important cognitive capacity. However, if we apply the same criteria to Einstein's theory of relativity, or the music of Mozart or Beethoven, then the absurdity of this position becomes clear. Certain cognitive capacities are well developed in just a few people.

Another question should also be asked: Why would the brain evolve capabilities which are suppressed? Why did neural structures evolve which can process multiple sensations simultaneously, but then come to be inhibited

by serotonin? Why would activation of specific brain areas result in the sensation of having left their body, or being privy to cosmic wisdom, or witnessing events and entities which appear to be from other dimensions or realities?

These experiences are made possible by the brain. They must serve an adaptive function. These capabilities must have evolved following natural selection. Why would we evolve the ability to hallucinate or dream about that which supposedly does not exist? Why should we have evolved the ability to hallucinate that we have left our bodies, or can see inside our hands, or dream that a friend will tragically die days before his accidental death?

One possibility is the human brain is de-evolving, and has lost or is losing capabilities which served a more adaptive purpose in ancient humans 30,000 to 10,000 years ago--ancient humans (the Cro-Magnon) whose brain was 1/3 larger in size than the modern brain! The Cro-Magnon men stool 6 ft tall on average, and the Cro-Magnon people created the magnificent underground cathedrals of art which first began to appear 30,000 years ago.

Comparison of modern human skull superimposed on Cro-Magnon skull (Left). Cro-Magnon skull (Right). The Cro-Magnon brain was 1/3 larger on average, than the modern human brain.

Conversely, it may be that these are capacities which are still evolving, but which at the present stage of human evolution, the human brain is unable to utilize adaptively. Consider, the evolution of language. Certainly, Australopithecus, Homo habilis, Homo erectus, and Neaderthals did not engage in complex conversations (Joseph 1996, 2000, 2001). We can surmise based on indirect evidence, that the language capabilities of these ancient hominids and humans may have been limited to grunts, groans, screams, and a variety of emotional sounds (Joseph 2000). Whatever language abilities ancestral species evolved prior to 100,000 years ago were primitive manifestations of what was yet to evolve, i.e. grammatical speech, reading, writing, and associated modes of abstract thinking, such as math. Although the rudimentary foundations had been laid long ago, these were only primitive steps toward what was later to more fully evolve.

It can be surmised that if humans continue to evolve, that maybe 100,000 years from now they will possess a brain which is able to fully utilize capacities which the modern brain is, as yet, unable to master. Or, just as the brain has shrunk by 1/3 in size since the ending of the Paleolithic, that it may

continue to lose capacities due to advances in technology which will increasingly render reading, writing, speaking, or creative endeavors obsolete.

Based on the evidence marshaled here and elsewhere, it can be inferred that not all dreams and hallucinations are dreams and hallucinations. They are mental capabilities which are de-evolving or still evolving, and which are or were destined to serve a specific purpose: Lifting the veil so we can gaze deeply into the past, the future, and the unknown.

References

Amaral, D. G., Price, J. L., Pitkanen, A., & Thomas, S. (1992). Anatomical organization of the primate amygdaloid complex. In J. P. Aggleton (Ed.). The Amygdala. (Wiley. New York.

Applegate, C. D. (1980). 5,7,-dihydroxytryptamine-induced mouse killing and behavioral reversal with ventricular administation of serotonin in rats. Behavioral and Neural Biology, 30, 178-190.

Baldwin, M., Lewis, S. A., & Bach, S. A. (1959). The effects of lysergic acid after cerebral ablation. Neurology, 469-474

Baldwin, M., Lewis, S.A., & Bach, S.A. (1959).The effects of lysergic acid after cerebral ablation.Neurology, 9, 469-474.

Barker, J. (1967). Premonitions of the Aberfan Disaster, JSPR, 44, 169-181

Bear, D. M. (1979). Temporal lobe epilepsy: A sydnrome of sensory-limbic hyperconnexion. Cortex, 15, 357-384.

Benninger, R. J. (1989). The role of serotonin and dopamine in learning to avoid aversive stimuli. In T. Archer & L-G Nilsson (Eds) Aversion, Avoidance and Anxiety. New Jersey, Erlbaum.

Bennett, Jr. J. P., and Snyder, S. H. (1975). Stereospecific binding of d-lysergic acid diethylamide (LSD) to brain membranes: Relationship to serotonin receptors. Brain Research, 94, 523-544.

Bennett, Jr. J. P., and Snyder, S. H. (1976). Serotonin and Lysergic Acid Diethylamide Binding in Rat Brain Membranes: Relationship to Postsynaptic Serotonin Receptors. Molecular Pharmacology, 12, 373-389.

Bertini, M., Violani, C., Zoccolotti, P., Antonelli, A., & DiStephano, L. (1983). Performance on a unilateral tactile test during waking and upon awakenings from REM and NREM. In W. P. Koella (Ed.), Sleep, (pp. 122-155). Basel: Karger.

Bogen J.,& Bogen,C. (1969).The other side of the brain: III. The corpus callosum and creativity. Bulletin of the Los Angeles Neurological Society, 34, 191-220.

Botez, M. I., Olivier, M., Vezina, J.-L., Botez, T., & Kaufman, B. (1985). Defective revisualization: Dissociation between cognitive and imagistic thought case report and short review of the literature. Cortex, 21, 375-389.

Brandon, S.G. F. (1967) The Judgment of the Dead. New York, Scribners.

Broughton, R. (1982). Human consciousness and sleep/waking rhythms: A review and some neuropsychological considerations. Journal of Clinical Neuropsychology, 4, 193-218.

Budge, W. (1994). The Book of the Dead. New Jersey, Carol.

Calvo, J. M., Badillo, S., Morales-Ramirez, M., Palacios-Salas, P. (1987) The role of the temporal lobe amygdala in ponto-geniculo-occipital activity and sleep organization in cats. Brain Research, 403, 22-30.

Campbell, J. (1988) Historical Atlas of World Mythology. New York, Harper & Row.

Cartwright , R. (2010) The Twenty-four Hour Mind: The Role of Sleep and Dreaming in Our Emotional Lives. Oxford University Press.

Cartwright, R. D., Tipton, L. W., & Wicklund, J. (1980). Focusing on dreams. Archives of General Psychiatry, 37, 275-288.

Chapman, L. F., & Walter, R. D. (1965). Actions of lysergic acid dienthalamid on averaged human cortical evoked rsposnes to light flash. Recent Advances in Biological Psychiatry, 7, 23-36.

Chapman, L. F., Walter, R. D., Ross, W., et al. (1963). Altered electrical activity of human hippocampus and amygdala induced by LSD-25. Physiologist, 5, 118.

Courtois, C.A. (1995). Healing the Incest Wound. New York, Norton.

Daly, D. (1958) Ictal affect. American Journal of Psychiatry, 115, 97-108.

Dossey, L., Greyson, B., Sturrock, P. A., Tucker, J. B. (2011). Consciousness -What Is It? Shared Consciousness, Twin Consciousness, Near Death, Journal of Cosmology, Vol 14. In press.

Eadie, B. J. (1992). Embraced by the light. California, Gold Leaf Press.

Foulkes, W. D. (1962). Dream reports from different stages of sleep. Journal of Abnormal and Social Psychology, 65, 14-25.

Frazier, J. G. (1950). The golden bough. Macmillan, New York.

Freud, S. (1900). The interpretation of dreams. Standard Edition (Vol 5). London: Hogarth Press.

Gloor, P. (1997). The Temporal Lobes and Limbic System. Oxford University Press. New York.

Goldstein, L., Stoltzfus, N. W., & Gardocki, J. F. (1972). Changes in interhemispheric amplitude relationships in the EEG during sleep. Physiology and Behavior, 8, 811-815.

Greenwood, P., Wilson, D. H., & Gazzaniga, M. S. (1977). Dream report following commissurotomy. Cortex, 13, 311-316.

Gresch, P. J., Strickland, L. V. and Sanders-Bush, E. (2002). Lysergic acid diethylamide-induced Fos expression in rat brain: role of serotonin-2A receptors. Neuroscience, 114, 707-713.

Grinker, R. R., Spiegel, J. P. (1945) Men Under Stress. McGraw-Hill, New York.

Halgren, E. (1992). Emotional neurophysiology of the amygdala within the context of human cognition. In J. P. Aggleton (Ed.). The Amygdala. New York, Wiley-Liss.

Halgren, E., Walter, R. D., Cherlow, D. G., & Crandal, P. H. (1978). Mental phenomenoa evoked by electrical stimualtion of the human hippocampal formation and amygdala, Brain, 101, 83-117.

Harris, M. (1993) Why we became religious and the evolution of the spirit world. In Lehmann, A. C. & Myers, J. E. (Eds) Magic, Witchcraft, and Religion. Mountain View: Mayfield.

Hasselmo, M. E., Rolls, E. T., & Baylis, G. C. (1989). The role ofexpression and identity in the face-selective responses of neurons in thetemporal visual cortex of the monkey. Behavioral Brain Research, 32,203-218.

Hecaen, H., & Albert, M. L.(1978). Human Neuropsychology, New York: John Wiley.

Hodoba, D. (1986). Paradoxic sleep facilitation by interictal epileptic activity of right temporal origin. Biological Psychiatry, 21, 1267-1278.

Hobson, J. A. (2004) Dreaming: An Introduction to the Science of Sleep. Oxford University Press.

Hoppe, K. D., & Bogen, J. E. (1977). Alexithymia in twelve commissurotomized patients. Psychotherapy and Psychosomatics, 28, 148-155.

Horowitz, M. J., Adams, J. E., & Rutkin, B. B. (1968). Visual imagery on brain stimulation. Archives of General Psychiatry, 19, 469-486.

Humphrey M. E., & Zangwill, O. L. (1911). Cessation of dreaming after brain injury. Journal of Neurology, Neurosurgery, and Psychiatry, 14, 322-325.

Jacobs, B. L., & Azmita, E. C. (1992). Structure and function of the brain Serotonin System. Physiological Reviews, 72, 165-245.

Joseph, R. (1988a) The Right Cerebral Hemisphere: Emotion, Music, Visual-Spatial Skills, Body Image, Dreams, and Awareness. Journal of Clinical Psychology, 44, 630-673.

Joseph, R. (1988b). Dual mental functioning in a split-brain patient. Journal of Clinical Psychology, 44, 770-779.

Joseph, R. (1992a) The Limbic System: Emotion, Laterality, and Unconscious Mind. The Psychoanalytic Review, 79, 405-456.

Joseph, R. (1992b). The Right Brain and the Unconscious. New York, Plenum.

Joseph, R. (1996). Neuropsychiatry, Neuropsychology, Clinical Neuroscience, 2nd Edition. 21 chapters, 864 pages. Williams & Wilkins, Baltimore.

Joseph, R. (1999a). Frontal lobe psychopathology: Mania, depression, aphasia, confabulation, catatonia, perseveration, obsessive compulsions, schizophrenia. journal of Psychiatry, 62, 138-172.

Joseph, R. (1999b). The neurology of traumatic “dissociative” amnesia. Commentary and literature review. Child Abuse & Neglect. 23, 715-727.

Joseph, R. (2000). The evolution of sex differences in language, sexuality, and visual spatial skills. Archives of Sexual Behavior, 29, 35-66.

Joseph, R. (2001). The Limbic System and the Soul: Evolution and the Neuroanatomy of Religious Experience. Zygon, the Journal of Religion & Science, 36, 105-136.

Joseph, R. (2002). NeuroTheology: Brain, Science, Spirituality, Religious Experience. University Press.

Joseph, R. (2011a). Origins of Thought: Consciousness, Language, Egocentric Speech and the Multiplicity of Mind Journal of Cosmology, 14.

Joseph, R. (2011b). Life on Earth Came from Other Planets. Cosmology Science Publishers, Cambridge.

Jouvet, M. (2001). The Paradox of Sleep: The Story of Dreaming. MIT press.

Jung, C. G. (1945). On the nature of dreams. (Translated by R.F.C. Hull.), The collected works of C. G. Jung, (pp.473-507). Princeton: Princeton University Press.

Jung, C. G. (1964). Man and his symbols. New York: Dell.

Kamiya, J. (1961). Behavioral, subjective and physiological aspects of drowsiness and sleep. In D. W. Fiske, & S. R. Maddi (Eds.). Function of varied experience, (pp. 145-174). Homewood, IL: Dorsey Press.

Kawashima, R., Sugiura, M., Kato, T., et al., (1999). The human amygdala plays an important role in gaze monitoring. Brain, 122, 779-783.

Kerr N. H., & Foulkes, D (1978). Reported absence of visual dream imagery in a normally sighted subject with Turner's syndrome. Journal of Mental Imagery, 2, 247-264.

Kerr, N. H., & Foulkes, D. (1981). Right hemisphere mediation of dream visualization: A case study. Cortex, 17, 603-611.

Klein, R., & Armitage, R. (1979). Rhythms in human performance: 11/2 hour oscillations in cognitive style. Science, 204, 1326-1328.

Kling. A. S. & Brothers, L. A. (1992). The amygdala and social behavior. In J. P. Aggleton (Ed.). The Amygdala. New York, Wiley-Liss.

Kripke, D. F., & Sonnenschein, D. (1973). A 90 minute daydream cycle. Sleep Research, 2, 187-188.

Krippner, S (1993). The Maimonides ESP-dream studies Maimonides Medical Center, Journal of Parapsychology, 57, 279-319.

Lamon, W. H. (1865/1994). Recollections of Abraham Lincoln 1847-1865, by Ward Hill Lamon, University of Nebraska Press.

Lydic, R., Baghdoyan, H. A., & Lorinc, Z. (1991). Microdialysis of cat pons reveals enhanced ACh release during state-dependent respiratory depression. American Journal of Physiology, 261, 766-770.

MacLean, P. (1990). The Evolution of the Triune Brain. New York, Plenum.

Malh, G. F., Rothenberg, A., Delgado, J. M. R., & Hamlin, H. (1964). Psychological response in the human to intracerebral electrical stimulation. Psychosomatic Medicine, 26, 337-368.

Malinowski, B. (1954) Magic, Science and Religion. New York. Doubleday.

Meyer, J. S., Ishikawa, Y., Hata, T., & Karacan, I. (1987). Cerebral blood flow in normal and abnormal sleep and dreaming. Brain and Cognition, 6, 266-294.

Mesulam, M. M. (1981) Dissociative states with abnormal temporal lobe EEG: Multiple personality and the illusion of possession. Archives of General Psychiatry, 38, 176-181.

Monti, J. Pandi-Permal, S. R., Sinton, C. M. (2008). Neurochemistry of Sleep and Wakefulness, Cambridge U. Press.

Montigny, C. de, and Aghajanian G.K. (1977). Preferential action of 5-methoxytryptamine and 5-methoxydimethyltryptamine on presynaptic serotonin receptors: A comparative iontophoretic study with LSD and serotonin. Neuropharmacology, 16, 811-818.

Moody, R. (1977). Life after life. Georgia, Mockingbird Books.

Morris, J. S., Frith, C. D., Perett, D. I., Rowland, D., Young, A. W., Calder, A. J., & Colan, R. J. (1996). A differential neural response in the human amygdala to fearful and happy facial expression. Nature, 383, 812-815.

Mullan, S., & Penfield, W. (1959). Epilepsy and visual halluciantions. Archives of Neurology and Psychiatry, 81, 269-281.

Murri, L., Arena, R., Siciliano, G., Mazzotta, R., & Muratorio, A. (1984). Dream recall in patients with focal cerebral lesions. Archives of Neurology, 41, 183-185.

Nadel, L. (1991). The hippocampus and space revisited. Hippocampus, 1, 221-229.

Neihardt, J. G. & Black Elk, (1979). Black Elk speaks. Lincoln. U. Nebraska Press.

emchin, A. A., Whitehouse, M.J., Menneken, M., Geisler, T., Pidgeon, R.T., Wilde, S. A. (2008). A light carbon reservoir recorded in zircon-hosted diamond from the Jack Hills. Nature 454, 92-95.

Noyes, R., & Kletti, R. (1977) Depersonalization in response to life threatening danger. Comprehensive Psychiatry, 18, 375-384.

O'Keefe, J. (1976). Place units in the hippocampus of the freely moving rat. Experimental Neurology, 51, 78-109.

O'Keefe, J., & Bouma, H. (1969). Complex sensory properties of certain amygdala units in the freely moving cat. Experimental Neurology, 23, 384-398.

O'Neil, J., Carlson, R. W., Francis, E., Stevenson, R. K. (2008). Neodymium-142 Evidence for Hadean Mafic Crust Science 321, 1828 1831.

Parson, E. R. (1988). Post-traumatic self disorders (PTsfD): Theoretical and practical considerations in psychotherapy of Vietnam War Veterans. In J. P. Wilson, Z. Harel, & B. Kahana (Eds). Human Adaptation to Extreme Stress. New York, Plenum.

Pena-Casanova, J., & Roig-Rovira, T. (1985). Optic aphasia, optic apraxia, and loss of dreaming. Brain and Language, 26, 63-71.

Penfield, W., & Perot, P. (1963). The brains record of auditory and visual experience. Brain, 86, 595-695.

Perryman, K. M., Kling, A. s., & Lloyd, R. L. (1987). Differential effects of inferior temporal cortex lesions upon visual and auditory-evoked potentials in the amygdala of the squirrel monkey. Behavioral and Neural Biology, 47, 73-79.

Purpura, D. P. (1956). Electrophysiological analysis of psychotogenic drug action. I & II. Archives of Neurology & Psychiatry, 40, 122-143.

Rawlings, M. (1978). Beyond deaths door. London, Sheldon Press.

Ribeiro, S., Goyal, V., Mello, C. & Pavlides, C. (1999). Brain gene expression during REM sleep depends on prior waking experience. Learning & Memory, 6: 500-508.

Ribeiro, S., Mello, C., Velho, T., Gardner, T., Jarvis, E., & Pavlides, C. (2002). Induction of hippocampal long-term potentation during waking leads to increased extra hippocampal zif-268 expression during ensuing rapid-eye-movement sleep. Journalof Neuroscience, 22(24), 10914-10923.

Riberio, S., Simões, C. & Nicolelis, M. (2008). Genes, Sleep and Dreams. In Lloyd & Rossi (Eds.) Ultradian rhythms from molecule to mind. Springer. N.Y., 413-430.

Ring, K. (1980). Life at death. New York, Coward, McCann & Geoghegan.

Rolls, E. T. (1984). Neurons in the cortex of the temporal lobe and in the amygdala of the monkey with responses selective for faces. Human Neurobiology, 3, 209-222.

Rolls, E. T. (1992). Neurophysiology and functions of the primate

amygdala. In J. P. Aggleton (Ed.). The Amygdala. New York, Wiley-Liss.

Sabom, M. B. (1982). Recollections on death. New York, Harper & Row.

Sawa, M., & Delgado, J. M. R. (1963). Amygdala unitary activity in the unrestrained cat. Electroencephalography and Clinical Neurophysiology, 15, 637-650.

Schenk, L., & Bear, D. (1981) Multiple personality and related dissociative phenomenon in patients with temporal lobe epilepsy. American Journal of Psychiatry, 138, 1311-1316.

Serafetinides, E. A. (1965). The significance of the temporal lobes and of hemisphere dominance in teh production of the LSD-25 symptomology in man. Neuropsychologia, 3, 69-79.

Schutze, I., Knuepfer, M. M., Eismann, A., Stumpf, H., & Stock, G. (1987). Sensory input to single neurons in the amygdala of the cat. Experimental Neurology, 97, 499-515.

Slater, E. & Beard, A.W. (1963). The schizophrenia-like psychoses of epilepsy. British Journal of Psychiatry, 109, 95-112.

Soubrie, P. (1986). Reconciling the role of central serotonin neurons human and animal behavior. Behavioral and Brain Sciences, 9, 319-364.

Spoont, M. R. (1992). Modulatory role of serotonin in neural information processing: Implications for human psychopathology. Psychological Bulletin, 112, 330-350.

Steriade, M. M. & McCarley, R. W. (2005) Brain Control of Wakefulness and Sleep, Springer.

Strahlendorf, J. C. R., et al., (1982). Differential effects of LSD serotonin and l-tryptophan on visually evoked responses. Pharmacology Biochemistry and Behavior, 16, 51-55.

Subirana, A., & Oller-Daurelia, L. (1953). The seizures with a feeling of paradisiacal happiness as the onset of certain temporal symptomatic epilepsies. Congres Neurologique International. Lisbonne, 4, 246-250.

Tarachow, S. (1941). Tjhe clinical value of hallucinations in localizing brain tumors. American Journal of Psychiatry, 99, 1434-1442.

Taylor, D. C. (1972). Mental state and temporal lobe epilepsy. Epilepsia, 13, 727-765.

Teuber, H. L., Battersfy, W. S., & Bender, M. B. (1960). Visual field defects after penetrating missile wounds of the brain. Cambridge: Harvard University Press.

Trimble, M. R. (1991). The psychoses of epilepsy. New York, Raven Press.

Turner, B. H. Mishkin, M. & Knapp, M. (1980). Organization of the amygdalopetal projections from modality-specific cortical association areas in the monkey. Journal of Comparative Neurology, 191, 515-543.

Ullman, M., & Krippner, S. (1970). Dream studies and telepathy; An experimental approach. New York: Parapsychology Foundation.

Ursin H., & Kaada, B. R. (1960). Functional localization within the amygdaloid complex in the cat. Electroencephalography and Clinical Neurophysiology, 12, 1-20.

Vertes, R. P. (1990). Brainstem mechanisms of slow-wave sleep and REM sleep. In W. R. Klemm, & R. P. Vertes (Eds.). Brainstem mechanisms of behavior. Wiley. New York.

Weingarten, S. M., Cherlow, D. G. & Holmgren. E. (1977). The relationship of hallucinations to depth structures of the temporal lobe. Acta Neurochirugica 24: 199-216.

Williams, D. (1956). The structure of emotions reflected in epileptic experiences.

Brain, 79, 29-67.

Wilson, I. (1987). The after death experience. New York, Morrow.

Wilson, J. A. (1951) The culture of ancient Egypt. Chicago, U. Chicago Press.

Wilson, M. A., & McNaughton, B. L. (1993). Dynamics of the hippocampal ensemble for space. Science, 261, 1055-1058.

Wiseman, R. (2011) Paranormality, Macmillan.

5. Near Death Experiences and the 5th Dimensional Spatio-Temporal Perspective

Jean-Pierre Jourdan, M.D.
IANDS-France President Director of medical research, International Association for Near-Death Studies, 28 Av. Flourens Aillaud, 04700 Oraison, France,

Abstract

The cognitive and perceptive characteristics of 70 cases of Near Death Experiences have been studied. The detailed analysis of the unusual modes and characteristics of spatial and temporal perception during these experiences reveals a "hidden" logic for which I propose a model where the point of perception would be in an extra dimension. The appropriateness of such a model is analyzed and shown to be consistent with the NDE accounts in the study. In contrast, those interpretations of such perceptions as being purely hallucinatory are undermined. Whatever its meaning, the underlying logic shown in this study suggests that NDEs seem to follow precise rules. Since these experiences can be viewed as an unusual but consistent behavior of consciousness, they deserve further pluridisciplinary study.

KEY WORDS: NDEs; consciousness; perception; information; modelling; large extra dimensions; 5D; space-time.

1. Introduction

The perceptions we are going to study here come from persons who, having survived a cardiac arrest or some other life-threatening circumstances, report a Near-Death-Experience (NDE). Although they were totally unconscious for any witness around them, these patients frequently report clear memories and can describe accurately their vicinity, including details that can be checked afterwards and scenes that allow clarifying the "moment" of the experience, all that seemingly perceived from a point external to their body.

The number of NDE cases with objective perceptions is far from

anecdotal: of the 70 cases included in this study, 48 (68.5%) involve what one calls an "Out of Body" (OBE) stage (at the very least, all declare having "seen" their bodies and the surrounding activity from a perspective outside the body). Of these 48 cases, 23 (47.9%) report precise perceptions corresponding to verified details in the environment and/or to scenes which took place just as described, thus giving a precise idea of when the actual experience occurred.

Many cases of this type (Sabom 1993-1998, Ring,1980, Ring & Valarino1997, Van Lommel 2001, Jourdan 2006) have been reported, and two recent cases have been the subject of thorough investigations (Sartori and Al., 2008). These apparently nonphysical veridical NDE perceptions (AVPs) are extensively discussed in (Holden and Al. 2009, Holden 2009).

An important point needs to be specified here: despite a superficial similarity, these experiences have to be properly differentiated from well known and explained phenomena like sleep paralysis or lucid dreams (Jourdan 2006).

A classical NDE comprises several stages (OBE stage, tunnel, perception of a brilliant light, life review, encountering a " being of light" and/or deceased relatives, feeling of a limit not to be trespassed…), the majority of which, although very similar within different accounts, are for the time being beyond the reach of objective study. Only, the OBE stage shows some apparently objective elements, and is therefore a good candidate for a scientific investigation.

But sometimes, as we are about to see, research in a specific field may have surprising results.

2. A Strange Account

In the late 90s, while he was telling me his experience, he stressed how his consciousness had "seen" his surroundings while it was happening:

"I was able to see the sofa and my body simultaneously from all directions. I saw my body through the sofa, I could see the top of my head and in the same time I saw my left and right sides and the sofa from below and from above, and all the room like that, I was everywhere at the same time!". Dashing off several sketches, front and side-on views as well as views from above, below, etc., he repeated "I saw all that".

Trying to schematize a perception "from everywhere", I drew a circle

around a person lying on a sofa and mused aloud: “in fact, it’s as if you had “seen” simultaneously from all points of a sphere surrounding the scene”. At that moment, I realized that the drawing allowed me to see the couch as well as the body from all angles simultaneously. Moreover, the back of the sofa did not need to be transparent to allow seeing the left side of the body lying on it … Essentially, I was looking at a two-dimensional universe (the drawing) from the third dimension, which allowed me to perceive simultaneously everything in it.

Nothing magic about all that, but was it that simple? Even if we do not go further than Euclidian geometry, considering only spatial dimensions for the time being, the scene described by the experiencer was three-dimensional. Everything happened as though during his NDE he had perceived from a point external to our universe, thus logically… from a fourth dimension! Of course, this interpretation seemed somewhat speculative (!) but nevertheless seemed compatible with some old accounts I had not paid attention to, thinking they were just curiosities. Going back to these latter, I found some similar evidences which persuaded me to investigate in detail the perceptual particularities in NDEs.

Without making any assumptions as to the reality of these paradoxical perceptions, be it as it may it was interesting as a first step to define their modalities by asking the patients to specify how they perceived things during the experience.

One could have expected to find various eccentric features, they could have described only more or less vague outlines, black and white, fanciful, soft or garish colours, distorted shapes, imaginary details or scenes, etc. But none of this was to be found in their answers. All that they described was perfectly banal considering the circumstances. All, except for the way they perceived the environment! Apart from those who were unable to give precisions, the answers were quite strange, while remaining confined in several precise categories.

3. Overview: Out of Body Multi-Dimensional Consciousness

An overview of the testimonies and extracts cited in this paper (recorded at the IANDS-France association and are taken from Jourdan 2000, 2001 and 2006).

I was surprised that I could see at an angle of 360°, I could see in front

and behind, I could see underneath, from far, I could see up close and also transparently. I remember seeing a stick of lipstick in one of the nurses' pockets. If I wanted to see inside the lamp which illuminated the room, I would manage to, and all of this instantly, as soon as I wanted to. I could say how people were dressed, I could see the sandstone wall, and also the stone slabs of the floor. I was able to verify their presence in a photograph later on since I thought it strange and anachronistic to have such slabs in an operating room. It was surprising and I could see, all at once, a green plaque with white letters saying "Manufacture de Saint Etienne". The plaque was under the edge of the operating table, covered up by the sheet I was lying on. I could see with multiple axes of vision, from many places at once. This is the reason why I saw this plaque under the operating table, from a completely different angle, since I was up there by the ceiling and I still managed to see this plaque located under the table, itself covered by a sheet. When I wanted to check this, we realized the plaque really was there and read "Manufacture d'armes de Saint Etienne". (J.M.).

Table 1. The most frequently reported perceptual features are summarized in Table.

Perceptual features	Out of 48	
Global perception	17	35,4%
360?spherical perception	15	31,3%
Perception "from everywhere"	12	25%
Perception by transparency	18	37,5%
Zoom/ instantaneous displacement	15	31,3%

4. Establishing a Model

Rather than a theory, what I will now propose is a model that allows to understand every seemingly irrational feature we have just outlined. We will now try to understand how the perception of a n-dimensional universe from a vantage point situated in an n+1 universe differs from its usual perception from "inside".

If we are able to see everything in the plan below, looking at it as a whole or focusing our attention on each of its details, it is because our point of perception is situated away from it. This "global perception" obviously disappears when the vantage point belongs to the observed universe, as is the case with an imaginary being who lives in the diagram: Tweedee (he only

possesses Two Dimensions and is visible in his bedroom). In his universe, he is subject to the same limitations as us. He can only see what is within his visual field, he cannot cross the walls neither see inside or through them. In short, all that is quite normal.

Yet you and I see his house in its entirety at a glance, we do not need to move around to see the damaged car in the garage or his step-mother in front of the fridge. We see all the stools simultaneously, as we do the paintings -even the hidden one-, without the need to turn around or see through the walls. Which is also normal... Depending on the spot from where we perceive, these two totally different viewpoints are both equally logical. Comparing them will allow us to understand the apparently irrational perceptions described in the NDEs.

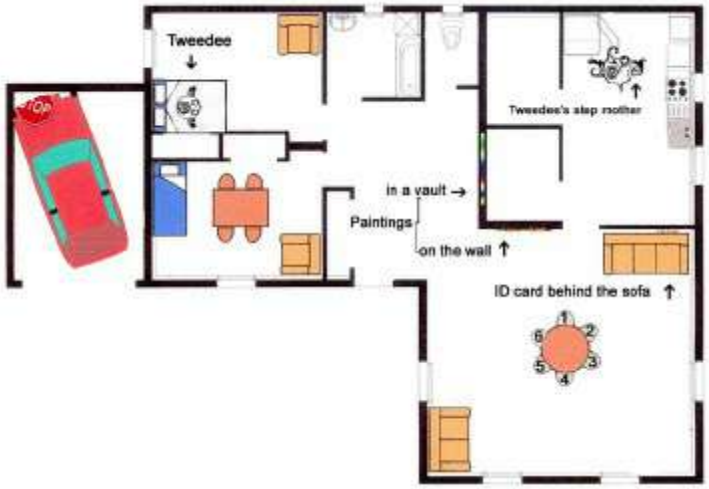


Figure 1. Tweedee's house.

For that, let us suppose that Tweedee suffers a cardiac arrest and "lives" an NDE. We will now assume that for the duration of his experience his perception will be similar to ours. But what is perfectly normal and common for us is not for him. When he returns, how will he manage to describe the particular features of this perception, which is all but ordinary for him?

Here is an example that describes perceiving a scene or the environment in a way that is unusual, but nevertheless frequent during a NDE:

I was at ceiling level in the emergency room, above my head. I could see myself lying down on the bed. A (male) doctor was working the resuscitation machines on my left. There was ringing everywhere. It was quite surreal. A nurse was close to me, adjusting perfusions and other tubes. Another nurse

was running back and forth between the doctor and my bed, leaving the room and then coming back, running, all the time The nurse next to me was talking to me, “Stay with us, this isn’t the time to leave”. I saw her slapping me. I was fine. I no longer felt pain. I said, “Why do you want me to come back, when it’s not hurting for once.”. Then I added, “Oh all right,” but I really wasn’t happy about it. What could be verified was the number of people in the room and what they were doing and saying.

Jourdan: “Did the notions of up and down, left and right make any sense?”

Yes. For the resuscitation scene I was at the top of the room at ceiling level. It is a notion of the orientation of things, in relation to each other. Not a real geographical, physical, position. It’s hard to explain.

Jourdan: “Is there a difference (or a contradiction) between what you perceive (things stay in their usual positions with respect to one another) and the fact that the scene is perceived in a global way, which means that the position of objects in relation to where you are is impossible to define?”

No, for me there is no contradiction. People and things are properly oriented in respect to one another in three dimensions. However, we see the scene globally, by this I mean in its entirety. It’s difficult to explain. For example, if you have a person on the ground placed in front of an object, you do not see this object. To see it you need to move. In this instance, it’s different. The person is really in front of the object. The way things are oriented stays the same. Despite this, you can still see the object. You don’t need to move. You see the entire scene. On the ground, you need to move, to change your angle of vision to see everything. There, you see everything without having to move. But people and things are placed normally in respect to one another.

Jourdan: “Did you have the impression of having a larger angle of vision, to see in front and behind you simultaneously?”

Yes. Total, instant vision.

Jourdan: “Did you have the impression you were seeing an object or scene from multiple locations at once?”

Yes, absolutely. This is what I meant before when speaking of an orientation but not of a real physical location. Once again, a total, instantaneous vision. (C.P.)

Tweedee is accustomed to live within a 2D plane but is now watching it

from our vantage point. Although this could sound completely surrealistic, the patient describes exactly what this latter could say: not a real geographical location. Indeed, his point of perception cannot be located anywhere inside what he perceives. He "sees the scene globally" , which is not easy to explain. Tweedee's step-mother is really in front of the fridge but she cannot hide it from him. Indeed, he has no need to move or change his angle of vision in order to "see" anything in his house.

This perception of his universe is as natural for us as it is strange for him! Let us now detail some peculiarities.

4. Instantaneous Moving and Zoom

Some NDErs report having explored their surroundings. A curious feature appears when one asks them to be more specific about the way they moved around: in fact, most of them hesitate between a displacement and a zooming sensation:

What must also be understood is that it works like a zoom and a displacement all at once. When we take an interest in something, it's as if we zoomed in. It is the displacement and perception occurring simultaneously which allows this to happen. It is hard to separate them, in the sense that there is no notion of time, thus no time spent moving. However, there is a certain notion of space, but not of space with limits and boundaries like in usual space. In the same way there is no compartmentalization or delineated directions, the notion of time and space aren't compartmentalized. It's hard to explain. (A.S.)

Jourdan: "How did this displacement happen? Instantly or not, sensation of moving, sense of speed, more of a zooming sensation without real displacement?"

This displacement was instantaneous but the question "More of a zooming sensation without real displacement" bothers me and it seems more or less that this is how it happened...What (maybe) makes me understand why, is a PC game that I've enjoyed recently where the hero "Predator" often used this "Zoom" function to move about. Every time I pressed the "Zoom" button I was both disturbed and happy to use this function...which in fact reminded me of this state. Maybe this is why I felt so light... (maybe I wasn't moving about after all, maybe it was my highly developed vision which gave me the feeling of moving about...). (F.E.)

In everyday life, we unconsciously associate being in a spot with perceiving from it. If Tweedee's attention is attracted to a detail, he will focus on it, just as our gaze can instantly switch from the step-mother to the garage where it will be rapidly attracted to the incongruous "STOP" sign.

The only thing which has changed is the direction of our gaze, but for Tweedee, who is accustomed to see his universe from within, the feeling is that of being able to move instantly and/or to "zoom" on to a detail:

My displacements were subject to my will with instantaneous effect. Instant zooming of my vision, without any displacement on my part. When I was on the outside in the park at tree level, I remember experiencing this zoom effect very clearly since I could see inside a tree without having moved. (J.M.)

I see everywhere at once, except when I target an object towards which I am "hurled" at great speed, as if I was zooming onto it. (…) It is like a rapid zoom to be there where I am looking. Like a very fast zoom, I cannot recall if it really is a displacement, or simply a zoom, but I was where I was aiming at, so there is a displacement...actually I don't know but it is very pleasant and fun. (Be.N.)

My consciousness, like a beam of light, can move around very fast, nearly instantly. This gaze, just like thought, can in addition move about very rapidly from points that are distant to one another. (P.C.)

Moving around is done as if time does not exist anymore (or nearly). We "think" about where we wish to be and we make a volitional effort and we get there instantaneously (or nearly, since there is a sensation of movement, but very fast). (D.U.) A sort of sliding, moving by zooming. (J-Y.C.) Feeling of displacement, but ultrafast. (M.L.) Displacement: in one go (F.U.)

5. Crossing the Walls

Many NDErs claim having been capable to pass through walls or ceilings:

Everything was like in reality, exactly in the same place, with the same appearance except that I could see the elements of matter and pass through it. (D.U.)

Usually, Tweedee is of course unable to cross any wall and is used to pass through the doors. But if we move our gaze from the garage to the kitchen quite slowly, paying attention to everything we can see between them, our look will pass through several 2D walls without any difficulty. These latter,

which are for us only black lines, are usually perfectly real for him. How will Tweedee interpret that?

At some point, I told myself "I know this surgery but as I didn't know the rest of it, I would like to look a little more", then I went through the wall, I wonder how I moved and then I looked, but the next room was dark and black. (C-A.D.)

That's to say that during my transfer to A. Hospital in the fire-fighters' vehicle I felt my mind off from my body and hear the conversations of these people. Then, realizing this faculty of elevation I got out of the cabin of the vehicle through the ceiling … (R.H.)

A sudden upward attraction seized me up, making me go through all the physical structures of the building, without the slightest difficulty, neither any jolt. (F.I.)

I went through the ceiling of my room, through the roof, without pain (I was very surprised ...) (Cl.N.)

(...) Since I passed through the wall. (H.C.)

7. "360°" Perception Without Limiting the Field of Vision

A "360° spherical" perception is very common during NDEs:

I was surprised that I could see at an angle of 360°, I could see in front, I could see behind, I could see underneath… (J.M.)

I had a 360° spherical-like vision. (X.S.) I had a 360° angle of vision. … (N.D.)

Tweedee is usually as limited as we are : he can only see what is in front of him. If he looks at the painting on the living room's wall, the table and the stools surrounding it are behind him, therefore out of his visual field. If he now moves to our own external visual perspective, he will "see" everything around him –or more precisely around his point of projection without any movement. This "360°" perception can be interpreted as a "centrifugal" global perception where the subject is interested in what surrounds him:

It is not like the view from here, which is limited in its field of vision and acuity, which is dazzled or impressed by different things such as light or darkness. The vision is only focused when we move, as if we were aiming at target. Otherwise, we see everywhere.

Jourdan: "Did you have the impression you had a bigger angle of vision, that you were seeing in front and behind you simultaneously? "

Yes, without physically turning around, I could see everywhere. (Be.N.)

I had a global perception of the room, like a sphere. My field of vision was larger than usual. Global vision without the need to turn my head left/right or even to turn around. I did not need all of this. (F.E.)

In addition, we can notice the perspective that "changes a little" while the vision remains complete. This is exactly what happens when we watch the layout from a close and moving point of view.

I could see the whole room under me despite this position, and in particular a physical body lying on the bed, detached from me, far away, which I knew was my body, but which I wasn't inhabiting at that moment (...) It was then that I noticed I could move around in space voluntarily. This was interesting, new, and so I made a few trial movements. It seems to me that although my view of the room was always complete, panoramic, that the perspective changed a little according to my movements and my position in that space. (F.I.)

6. Perception "From Everywhere Simultaneously"

Our visual perception usually originates in a single vantage point. Obviously, this restriction disappears during many NDEs:

I visited various places I managed to identify afterwards. I remember a window in a village, a building with very white plaster, sand-carved windows. My curiosity was attracted to details. This is quite important, since we cannot do this normally, like seeing inside and outside at the same time, an impression of a quasi holographic vision... Not a panoramic view, but seeing in front, behind, all details simultaneously which is completely different from ordinary sight. It is very rich. (A.S.)

Tweedee's attention is now attracted by his own body, his point of perception being at a few centimeters from the plan. He will obviously be surprised to simultaneously "see" both his hands, the back of his head as well as the tip of his nose. It is a "centripetal" global perception now. For him, the sole way of understanding that will be the impression of "seeing" from everywhere at once:

I could see from above, 360° and from all sides, all at once. I see/am/feel this matter with my "sight from above" I see/am/feel this matter from underneath, I see/am/feel this matter which fills the room more and more, I see/am sideways, in profile, underneath, in front, behind, from everywhere, I am the spectator/actor/scene. I had a 360° spherical-like vision. I saw

everything and had different points of observation: above, sideways, from the front, underneath, it was really extraordinary to see and be all of it at the same time. When I saw the sofa, the furniture and the room in which I was, I was simultaneously above, sideways, from profile, facing forwards... it was very clear. (X.S.)

I noticed : “we see everything from all sides simultaneously!”, I could see everywhere. (N.D.)

As the distance between him and the observed universe is increasing, he can also, just as we do, “see” simultaneously different places:

And then I realized that I was both in that space and out of my body. I saw myself lifeless on the bed, I felt my body very heavy, I (my mind? my soul?) got to float around the room. On the one hand, I saw my friends who had gone to play cards, on the other I saw the basement window that attracted me. (K.E.)

Remembering that our vantage point is usually confused with the place we find ourselves in allows us to understand the NDErs who claim having “been” everywhere, J.M.P. who reports having seen an entire clinic and having “been” everywhere at once, and finally A.L. who describes an “enlarged vision” and “was” simultaneously at home and at her grand mother’s:

Here you see this, then elsewhere you see something else, you know everything, from one place to another from the spot where you are. For example, if I want to go to the window, I have to move. But there you don’t move, you’re everywhere. Unbelievable, but it’s great! (J-M.W.)

...because I found myself above, on the bottom, everywhere all at once in the clinic… I told you earlier on that I was in the bedroom or more precisely in Mrs.E’s bathroom. So, to tell you whether I used the stairs or not, no, I think not; hmm… This displacement cannot be explained since I was downstairs and upstairs, and everywhere all at once actually. (J.M.P.)

The funny thing is that we have a greatly enlarged vision of things. It was as if I was in many places at once. After their shower my children went to the village, to my grandmother’s who lived in a house opposite ours. It was on the other side of a big valley about 800 meters away. She often watched what was happening at our place with her binoculars. So, at the same time, I also found myself at my grandmother’s, who was saying: “Oh, something must have happened over at the parents’ place because the ambulance is there...”

She was watching with her binoculars, the children watched with her through the window and I, was behind them! It is a very strange impression, everything I saw was very luminous, very clear and my senses were sharpened, a much sharper perception of things, I saw and heard everything, all the while being pretty much in a coma. (A.L.)

7. Perception by Transparency

The cases of perception by transparency are recurrent in NDE accounts:

I could see everything at once and if I focused on one thing, I could see this thing through any obstacle and in every detail, from its surface to how its atoms were organized, truly a global and detailed vision. (M.L.)

I could see in front and behind oneself simultaneously, through objects, a holographic view. (A.R.)

This means that I did see the entire accident, I left the car and could see myself from above, thus the car's roof was transparent. (P.F.)

When I left my body, I could see through all objects. (C.C.) A very wide vision, through the walls if I wanted to. (K.E.)

This seemingly strange perceptual feature becomes easily understandable within our extra-dimensional model. Indeed, could Tweedee hide anything from our eyes?

Let us return to his house, in which there are at least two things he cannot usually see: a masterpiece painting in a vault placed inside the wall separating the hall and kitchen, and the identity card he has been looking for several days lying behind the couch.

Just like X.S who had the impression of seeing through the couch, so Tweedee will also have the impression of seeing the front and back of the sofa, his ID card, the two sides of the wall and the painting hidden within it, all at once. In our world as much as in his, when we can see both the front and the back of an object as well as that which stands behind it, it simply means that this object is transparent:

I also saw everything that was happening around me. It was in a tent and thus very dark. I went out of the tent very quickly, but the funny thing was that everything was transparent to me. It was very fast because I was rising rapidly, and I saw through the tent. (P.T.)

I was in a global vision, I could see as if I were using my eyes, with clarity, I saw everything at once, I could see everything at once, the

impression of seeing backwards and transparently. Sometimes as if I was inside my own eyes. (J-M.M.)

I saw myself exit, since I saw my body on the operating table. I was above and could see everything, everywhere, even through the surgeon. We see everything. -Could you see behind yourself or through objects ? Yes, through objects. (H.C.)

If the NDEr's attention is attracted to a detail, this latter will be perceived without anything being able to hide it. In fact, anything which could stand as an obstacle for normal vision such as a pocket, a curtain, a vault or a wall, is not so anymore:

From the memory of where my bed was placed -in the old people's wardand of how it was situated in the corner of the room : the door and the coming and going of the personnel were to the right of my head... Also, I think my normal sight should have been cut off and limited due to the wall stopping at my bed. This wall should have limited my visual capacity and I feel troubled remembering that... (F.E.)

I felt like a soap bubble with eyes strolling about above at ceiling level, in a space which seemed a little "closer" than real space. Behind a wall was a woman dying in the resuscitation room. I saw the instruments, the doctors' gestures and their conversation, I could see through the curtains which hung in front of the glass partition. (J-P-L.)

I could see up close and also transparently. I remember seeing a stick of lipstick in one of the nurses' pockets. If I wanted to see inside the lamp which illuminated the room, I'd manage, and all of this instantly, as soon as I wanted to. (J.M.)

If we look closely at Tweedee and his step-mother, we will see a spiral pattern representing their internal organs, which, for them, are usually as hidden as ours. But now that Tweedee perceives his own body from our vantage point, he is able to "see" inside or through his body… exactly like NDErs do:

I saw all around me, I saw the inside of my body. (M.H.)

After a while I see my "hand made out of crystal" and I tell myself ,"There I can see all the small blood-vessels, but how can it be, there I see all the small blood-vessels in my hand?". It amused me, nothing more. (D.J.)

When I was at ceiling level I could see through myself. (Be.N.)

During the excision of a vesicle in September 1972 and during the

anesthesia I found myself...well, floating on the left of the ceiling and looking down on the people operating. I was surrounded by medical personnel, at least 6 people who seemed to be working on my body. I had the time to see, to see...well...I had a very sharp vision and saw through a section of the table. I saw through the operating cloth which is around the operation...the shoes of...of one of the resuscitation team probably...One of them had untied shoe laces. Well, I went through the fabric and so...I came to the conclusion that they were actually resuscitating me. I therefore had the time to realize that it was my body and off I went into the tunnel. (F.U.)

10. Dynamic Perspective Effects

Until now, we have detailed only "static" effects. But it seems that in some cases the point of perception is likely to move, that translates as some new "dynamic perspective" effects.

Let us remember that Tweedee has only notions of moving along length and width, but not at all in height. How can he interpret his perceptions when the distance between his point of perception and his body gradually increases in a third dimension? Going up "perpendicularly", he moves away from his body and everything in its vicinity, while remaining above it. M.M. uses a nice expression to describe this feeling of moving away from her body in a direction perpendicular to our universe:

After the crash, I left my body in a "geographically total " manner. I was everywhere at once, with a panoramic view. (M.M)

Here is another way to describe the same perception:

After what I call the familiarization with the "walking around" state, I "went away" while I'm sure I stayed at the same place, I would say that my "sight" got "wider". (K.E.)

As Tweedee can see (and then "be") everywhere while being nowhere in his own universe, he can also describe this perceptual conflict as being "everywhere and nowhere at once":

I spoke again to the people involved and they were very surprised that I knew exactly what they told me during these times. Like the nurse to which I gave the names of those who came to see me, who thought that someone had told me ... It's as if all my senses were magnified. I could "feel" the people, "guess" them (something that still often happens to me). My vision seemed wider, I could have heard, understood and followed several conversations

without difficulty if I wanted ... It was very strange because I seemed to be "everywhere and nowhere at once " and with such clarity ... (M.Q.)

If he goes up even higher, he will see his body getting smaller and smaller. In his own universe, a thing will look smaller only if he moves away from it, but at a certain point the walls will prevent him to move back farther. Here is another perceptual conflict : considering the long distance from which he perceives now, he obviously ought to have crossed a wall, which then "seems to move back with him" :

Very slow moving, diagonally to the ceiling, upwards from the table that was there, as if I was there. But the ceiling seemed extremely high, it seemed that as far as I went upwards to this spot, the ceiling went up the same time as me. (C.F.)

Another way of describing the conflict is to "see through the concrete, and at the same time it is not the same thing" :

First, I watched all this bustle. Then I realized there was a body. I did not say, but when I say "up" is not a sight from two to three meters. I was much higher, much higher. I had a perception, an overview. I was not at three meters up. It was a holistic, panoramic view into the room. But from very high as if I could have seen through the concrete and at the same time it is not the same thing. I would rather say that I was in another dimension of space where I had another vision capability as if I were both very close and very far because I could see very fine details, every detail. I saw this body and at first I did not realize it was my body. (P.B.)

11. Peculiarities of Time Perception

Until now, we have considered the perception of a 2D universe from a third dimension that allowed us to understand the particularities reported by the NDErs. These latter seem extremely similar to those which would appear when a 3D space is perceived from an external vantage point, thus situated in an additional spatial dimension.

This notion of a fourth dimension is far from new. As a purely spatial extension, it has been evoked in the 19th (Bork 1964) and early 20th century as mathematical and geometric speculations (Bragdon 1913, Manning 1914, Durrel 1938, Rucker 1977, 1984), within metaphysics (Willink 1893, Zollner 1901, Gardner 1981), philosophy (Kant 1783) as well (remember some paintings from Picasso showing a model seen from several different places

simultaneously!) in fine arts (Dalrymple Henderson 1983).

As it concerns for the moment only the perception of space, the modelling I have set out until now can be considered as a purely geometrical analogy in an Euclidian affine extended space. A similar hypothesis has been proposed independently in 2003 by another NDE researcher (Brumblay 2003). But is it sufficient? Since Minkowski, Einstein and Poincaré's works, it is well known that we live in a four-dimensional world, in which space and time are closely linked within a spatio-temporal continuum. Thus there already exists a fourth time-like dimension and if we want to be rigorous we have now to talk at least of a fifth dimension.

11.1. No time The NDErs' answers to questions about their perception of time during their experience led us to enlarge the 4D spatial model to a 5D spatio-temporal one. For a start, during a NDE the notions of time or of duration may disappear:

Feeling that time no longer existed. (S.D.)

In fact, there was no time, it was like a moment of eternity. (K.E)

Time did not exist. Now it's a real knowledge for me, time does not exist! (M.M.)

On the other side, time does not exist. One truly realizes it. Time is a completely mental concept. A thousand years may be instantaneous. (M-P.S.)

There I had the distinct impression of finding myself in a familiar place, a place I had known. As if I was gone for some time and then back home Some time ... But what does it mean: "some time"? The concept of duration to which it usually refers was absent from this story. All I can say, even if I am unable to explain it, is that I existed in what might be called a kind of absolute timelessness. For this entire trip out of my body also unfolded outside of time. No body: no time! So I wonder whether our perception of temporal flow could not be an enormous performance, a joke. (M.N.)

Notion of time? No, I think we totally lose track of time. Maybe faster. But in reality I do not know, because it happens like flashes by, you see things, you hear, you see, it seems that everything happens at once. (A.L.)

11.2. An eternal present In other cases, a less drastic disappearance of time may be translated by various expressions. Many speak about an "eternal present", an "omnitime", or of a "time that no longer unfolds":

I could tell some facts that were going on at places where I was not supposed to be, since I was strapped to a bed in ICU. They checked, they

found it surprising that this was true, as this seems surprising to some that I talk to them about what happened. About their lives. They call it the past because they reason in terms of time, but there is no time outside the body. There is no past. There is no present, no future. There is an eternal present. (P.M.)

I had a horrible feeling of eternity. I had an experience where time no longer unfolded. Furthermore, no past, no future, just an eternal present. I had the feeling that all that was real, the feeling of "living" in eternity. (I.H.)

Their experience led C.N. to study Einstein, and H.R. to speak spontaneously of space-time as a whole:

I had no notion of time during the experiment. It's just another time, in fact we are no longer in time, it's omnitime, that is to say, the eternal present ... One is truly in the eternal present. There is no more time. But having said that, after my return, I had a very very big problem with time, I was very obsessed by time, space-time, that is what made me study Einstein, the fourth dimension, etc. Because at the same time I was very anxious at the idea of having no time, no time enough to do what I had to do, it's funny; I had a very very big problem with time having been out of time gave me a problem with the chronological time that we live on earth. At least I know I was in that omnitime and omnispace. (C.N.) No notion of time and no limit. To my knowledge there is no possibility of comparing the earthly time and that of this dimension. The whole makes up this space-time, a form of totality, comprehensiveness. (H.R.)

There is an apparent contradiction in living "out of time": to experience something, one must one way or another last. In fact, some expressions used by NDErs suggest that, during their experience, there remains at least a present allowing them to continue to exist, but it is also clear that this present of their own is no longer subject to the time arrow. Like an astronaut who is no longer submitted to gravity but who can watch the Earth with a telescope and see the fall of an apple, in their experience they "observe" a time which is no longer their own.

11.3. A second form of time We could consider a purely psycho-physiological explanation, as this "other form of time" might be a reconstruction by our brain, which is used to run sequentially, in particular with regard to memory, not to mention that the narrative of the experience can only be done sequentially too. But NDErs are adamant that, just like any

of the other perceptual particularities we have reviewed so far, this second time was experienced during their NDE and is registered in their memory as well as the rest, as shown by some pertinent remarks:

It is a profound conviction that I do not explain, displacements are infinitely fast but there is still a before and an after, a chronology and a souvenir of the action that just took place, so there is a form time but I cannot explain it. (Be.N.)

All this took place "outside time" or in a time that has no earthly reference. I had the impression of being outside of time, and yet there was some sort of time (it was another time). (A.T.)

As I said, in the absence of time there is still time. I know it sounds absurd, but I can not explain more. (J.X.)

The notion of time has nothing to do with ordinary life, that's for sure. Physical, material time does not exist. Time does not flow. To say that there is another " time system", I do not know. If there was a complete "timelessness," all emotions would be simultaneous. For me, anyway, I had various feelings. Knowledge is complete and simultaneous. Emotions not. We react emotionally to what we see. In my opinion, there must exist another form of time, anyway. (C.P.)

Jourdan: "Did you have a notion of time?"

Yes and no. Yes because events followed events. I feel they did not occur at the same time. No, because the concept of time is not the same. There is no yesterday, today and tomorrow. I would say that events are instantaneous but emotions come and go. And then maybe I say that the events follow one another because the emotions are, themselves, quite distinct from each other. Maybe it has nothing to do with the concept of temporality within ordinary life. No, because my own chronology doesn't match that of the ordinary world. Events that I placed before actually occurred afterwards when I asked for confirmation. And vice versa. (P.C.)

12. A Spatialized Time

Now, let us follow our 5D hypothesis through, supposing that during an NDE our 4D universe could really be perceived as a whole from an extra-dimension. If this hypothesis more or less reflects some reality, we ought to find some accounts reporting several kinds of temporal perspective.

12.1. Past, present, future, all confused If we walk on a lane, one part of

the way is behind us, another is ahead. But if we see this lane from above, no more walking on it, not only are we nowhere on it but also, as they were relative to us, the notions of behind and ahead logically disappear. In the same way, if we are “out of time” we are no more subject to its arrow. Thus the notions of past, present and future can disappear or merge together. In fact, almost every feature we are about to review seems to translate a spatialization of time:

Past, present future are merged in a single concept, that’s what I experienced (X.S.) Time no longer existed, past, present, future, all confused. (M.O.)

No sensation of duration, neither of waiting. No sense of past, present, future, as if all that was away from me. (F.E.)

During NDEs, frequently following the OBE stage, most patients describe a “life review”. They report having been able to “see” or sometimes “live again” some moments or only significant scenes of their life, in chronological order or in reverse order. During this stage some additional anomalies and perspective effects concerning time will appear, strengthening the hypothesis that our universe could be perceived from an external vantage point.

12.2. Flying over time The non-locality of the observer in relation to the observed universe, which has helped us understanding the spatial 4D perspective effects appears to concern also time: to be “outside” the space-time would give the same impression of “being” everywhere at once compared to the latter. The expressions are various, but translate the same strange feelings of perceiving time from outside or flying above it:

I had access to both past, present, future and any place in space. (M.Z.)

I had no access to the future, I don’t think so, but to the past yes, exactly so, as well as to present since I was seeing myself. It seems to me that I could move around. (P.B.)

I felt I could fly over time. (J-M.M.)

It seems to me that the time is no longer valid. That is, I don’t take place within time. There is no longer any past neither future, everything is within the same plane. I got out of the timeline and I can contemplate it AS A WHOLE. But thirty years later, I am still unable to define accurately, using common words, this perceived lack of time ... and both its presence. When you move from one place to another in a flash, when one sees multiple views of the same situation, physically and temporally, that’s not “every day life.”

Jourdan: “Have you had the impression of “flying over” time, as one can fly over a landscape, or see it from above?”

Yes, in some ways, move forward or backward at the same time. “Time” no longer appears as fragmented, but as a one and single moment: a “continuum” related to will and free will. (D.S.)

There, the time does not seem to unfold as here. I would say it’s “above”, a place from where you can “govern” the events and the destinies of the earthly world. Neither was there any space. (A.T.)

I wonder about the word “time”. I had the impression of “flying over” a certain portion of time, to fly so quickly but the time seemed at once long and short. That’s funny. I felt able to move in time. (F.N.)

When I saw my life, it was like an accelerating videotape, somewhat as if I could fly over it, it goes fast enough to review one’s life and yet it lasts forever, I can’t explain. (Be.N.)

13. Spatio-temporal Perspective

What could be the predictable consequences of a hypothetical perception from outside our spatio-temporal continuum? Within the framework of this 5D model, everything happens as though NDErs were able to take enough distance to see in perspective not only the immediate vicinity of their body, but also their whole life. Then we could now expect some precise temporal perspective effects.

In our everyday experience, the concepts of time and space are fundamentally different. It is surprising to find several accounts of a uniqueness that has nothing natural nor intuitive for us. Even if he finds it difficult to explain (what we will readily admit), J-Y.C. briefly summarizes relativity with some expressions that would have pleased Einstein. Even better, the way he watches his own life as what we could call a “4D spatiotemporal object” is amazing : a 3D form under his eyes, with an “integrated time” which doesn’t unfold, a life he can see from every angle, get more or less closer or change his angle of view, focusing on one part or another… exactly as we do in our everyday life when examining a banal 3D object.

Indeed, at the time I receive this new form of intelligence, I find before me ... my life. I look at this 3D thing that is my life and which does not unfold. The time is integrated in it, it is no more linear. All of one’s life is

visible and this “global” intelligence can read it, understand it. (…)

I saw my entire life, in relief, with all the details, people, situations. But in a time that does not unfold, life being seen from every angle with this universal or global understanding. My life was a form under my eyes, which contained everything and that I consulted.

(…) My whole senses were concentrated or condensed in a single understanding concept. The ability to understand and develop ALL, in its wholeness and in its detail. Should I have watched a car, I had known in one thought its mileage, fuel quantity, the wear of spark plugs, how many times it had turned left or right, the condition of all its parts, etc... It is very difficult to share the encompassing of the three dimensions with the fourth, which merge in a concept that can be easily read when one gets this form of over-intelligence.

(…) Time is no longer linear. Your own life is in 3D and the fourth dimension is fully integrated. At that time, if I had watched a man, I could have known everything about him. His age, height, blood type, his siblings, the amount of all his taxes, his diseases, etc.. etc.. ALL in a single concept.

Jourdan: “Did you feel yourself moving?”

Yes.

Jourdan: “When?”

To get closer to my life.

Jourdan: “How did it happen?”

A sort of sliding, zoom displacement.

The only “thing” that I was able to contemplate was my own life. An oblong shape, three-dimensional pink-orange hue (always “metallic” as having its own light). I could see inside, seeing-through my entire life course, inclu-ding time without unfolding time. To see another part of this life I just had to ºchange my angle of view. (J-Y.C.)

This second example is less spectacular, but we find again a “frozen time”, a “whole life spread before (the NDEr’s) eyes, its slices being seen instantly”:

Totally calm and in a state of unimaginable bliss, I continued to float in a world of breathtaking clarity where the notion of time, that seemed frozen, defies understanding. In tune with this inexplicable timelessness the slices of my life were seen instantly, without any sense of duration. That’s quite difficult to explain with “earthly words.” My past life did not just appear to

me like images following one another in a reverse chronology, as might be suggested by my previous comments. The events unfolded in accordance with the original script, but their succession went backward over the course of my life. Sometimes, and here it's even more difficult to explain, I felt like my whole life was spread before my eyes, undifferentiated in its stages, and still without the sequence of events being linked to time. I know it's crazy, totally incomprehensible, but that's the way it happened. (M.N.)

14. Discussion

NDE are frequently viewed as hallucinatory experiences. Indeed, in spite of numerous confirmed accounts reporting precise details and scenes in the immediate vicinity of unconscious patients, for the time being we have no irrefutable proof about AVPs.

On another hand, the hyperdimensional model I propose allows to understand very simply every seemingly strange perceptions, implying that these experiences could follow definite rules.

So we are faced with several possibilities. The first one is an "inner" hypothesis : NDE are purely subjective experiences, the AVPs being the result of brain activity, this latter having "rebuilt" scenes and details very close to the reality from various elements gathered after the experience. Joseph (1996, 2001) provides evidence which he believes demonstrates it is the hippocampus which is responsible for the hallucinations of floating above the body. As detailed by Joseph (2001):

"The hippocampus contains "place" neurons which are able to encode one's position and movement in space. The hippocampus, therefore, can create a cognitive map of an individuals environment and their movements within it. Presumably it is via the hippocampus that an individual can visualize themselves as if looking at their body from afar, and can remember and thus see themselves engaged in certain actions, as if one were an outside witness (Joseph, 1996). However, under conditions of hyperactivation (such as in response to extreme fear) it appears that the hippocampus may create a visual hallucination of that "cognitive map" such that the individual may "experience" themselves as outside their body, observing all that is occurring. In fact, it has been repeatedly demonstrated that hyperactivation or electrical stimulation of the amygdala-hippocampus-temporal lobe, can cause some individuals to report they have left their bodies and are hovering upon the

ceiling staring down. That is, their ego and sense of personal identity appears to split off from their body, such that they may feel as if they are two different people, one watching, the other being observed."

If this hypothesis proves to be the correct one, that would at least lead us to explore the hypothesis of some 5D-like brain organisation, which could present some interest for cognitive neurosciences, neurology, psychology, and all those disciplines which generally seek to explore the nature of consciousness and the functioning of our brain. Like radioactivity at its very beginning, what appears to be only an oddity can conceal major avenues of research.

Another possibility is that of an "outer" hypothesis. Nobody, at present, can clearly define consciousness. We can at the very most safely say that it is part of our world, follows the laws of nature and has been for a long time our only tool to try to puzzle over it. Could it, in some unusual circumstances, show us the first evidences of additional dimensions?

14.1. Four or five dimensions? It is important to clarify some potential confusions if we envisage an extra dimension. We have seen that the first proposals about this subject date back several centuries. At that time, scientists reasoned within an Euclidean space -which comprises only spatial dimensions-, envisaging a fourth spacelike dimension that was a virtual mathematical or geometrical concept. Nowadays, the mathematical setting of relativity is a Minkowski space comprising three spacelike dimensions and a timelike fourth dimension. Then, as our visible universe is a 4D space-time continuum, and considering the multiple accounts reporting spatio-temporal perspective effects, the extra dimension giving an accurate background to the model I have set out would be a fifth one.

14.2. Recent extra-dimensions theories The first proposal of a fifth dimension, in order to unify electromagnetism and gravity, comes from the German mathematician Theodor Kaluza (1921) and the Swedish physicist Oskar Klein (1926). This theory was abandoned, but after a few decades appeared superstrings and strings theories, largely initiated by Peter Freund (1982,1985), who introduced extra dimensions of space in physics and found the mechanisms by which these extra dimensions curl up. These theories involve 10, 11 or up to 26 extra dimensions, which are compactified, curled up at each point of our universe with a finite minuscule size (about the Planck length, i.e 10-33 cm in the K.K. theory). Obviously, this tiny size does not

offer a sufficient distance to allow the perspective effects that we have reviewed.

Derived from string theories, which concern essentially particle physics, brane cosmology is based upon brane theories, which attempts to understand the weakness of gravity within our visible universe. In brane theory, a string is a 1-brane, a “membrane” is a 2-brane. In general a p-brane (p is the number of spatial dimensions, therefore a p-brane is in practice a (p+1) space-time) is viewed as a slice inside a (p+1) brane. Thus, according to this theory, our four-dimensional universe is confined in a 3-brane within a 4-brane, a “super”universe endowed with (4+1) dimensions.

Following a first proposal (Antoniadis & al 1998, Arkani-Hamed & al 1998, 2000), Lisa Randall and Raman Sundrum established in 1999 two models of brane cosmology. In the first one (Randall and Sundrum 1999-a), the size of the extra dimension is finite, about 1mm, which is far better than the Planck length but still insufficient.

On the other hand, in the second one (Randall and Sundrum 1999-b) the extra-dimension might be infinite, which is perfectly suitable for the extradimensional modelling that I propose.

Another model, elaborated by Laurent Nottale (Nottale 1993, 2010, Nottale and Timar 2008), is scale relativity. Within it appear two interesting characteristics: a fifth topological dimension and a spatialization of time, which could explain the particularities that we have reviewed about the perception of this latter.

14.3. The Time issue During NDEs, our universe seems to be perceived not only as spatial but indeed as a whole space-time. Several testimonies seem to report some sort of time spatialization, and the main issue is to understand how that could be possible. Saying “our (3+1)D universe is a subset of a (4+1)D universe” implies that we have merely added a spacelike dimension, the time dimension remaining the same. Concerning this particular point, the status of time within extra-dimensional theories is not clear and above all I am not qualified to go further.

At the very most, I could perhaps say that we might understand the particularities described by NDERs such as “no time”, “eternal present”, “being out of time” by remembering that, according to relativity, an object or particle is subject to time – and therefore has a duration of its own only if it has a mass, and therefore suppose that “that which perceives” during an NDE

is massless.

Be that as it may, I hope one more time that qualified scientists will accept to think about that according to the accounts we have reviewed.

14.4 A predictive modelling? The modelling I propose, like every self-respecting model, must be predictive and lend itself to experimentation. We have seen that, to an observer whose vantage point is situated in a (n+1)D universe, nothing can be hidden within a (n)D universe. Thus a very simple test could be proposed, consisting of a hidden target (for example a colored drawing enclosed in a sealed envelope) put in the vicinity of places where NDEs are likely to occur (ICUs, surgery, etc.). Provided it is unusual and interesting enough, this target could attract the attention of an NDEr, who would be able to describe it after resuscitation.

15. Conclusion

In this short paper, I hope to have given the reader enough information so that he or she can make up his or her own mind about the hyperdimensional interpretation of perceptual particularities in NDEs. The fact that the perspective effects concern time as well as space, and that some patients without any training or education in physics were able to describe with their own words a spatio-temporal continuum seems to me particularly interesting.

To summarize, the particularities that we have reviewed could lead one to suppose that consciousness could be the result of some interactions between 4D and 5D phenomena and/or universes, an hypothesis we cannot simply dismiss and that is considered very seriously by some neuroscientists (Smythies 1994, 2003) and cosmologists (Carr 2008) as well as philosophers (Droulez 2010).

The look we have on a screen, a sketch, a painting or any 2D-like universe allows an instantaneous global information. Waiting for further research and results, the analysis of the perceptual particularities in NDEs in terms of global perception/acquiring of information, a concept that is coherent with our model, should allow us to conduct research calmly and in a purely scientific way. In addition, it should be free from all metaphysical a priori and use concepts which are already within our reach.

Whether the logic revealed by this analysis reflects a particular cerebral function, a new phenomenon or a combination of both, it casts doubt on purely hallucinatory interpretations of these experiences and constitutes an

argument in favor of scientific research into NDEs, justifying a multidisciplinary approach gathering physicians, neuroscientists, cognitive scientists, philosophers, psychologists, anthropologists, and now maybe, mathematicians, physicists and cosmologists.

ACKNOWLEDGMENTS: It is a pleasure to thank the editors of the Journal of Cosmology for inviting this paper, hoping that the evidences set out in it will represent some food for thought for its readers. I am grateful to the confidence NDErs graced me with, and for the time they spent answering my numerous and sometimes strange questions. Without them this study would never have seen the light. I am also eager to thank John Smythies and Thomas Droulez for their encouragements and for a careful proofreading of this paper.

References

Antoniadis I. & al (1998) ., New dimensions at a millimeter to a fermi and superstring at a Tev, Phys Lett B., 436, 257,.

Arkani-Hamed N., Dimopoulos S., Dvali G. (1998). “The Hierarchy problem and new dimensions at a millimeter”. Phys. Lett. B 436: 263–272.

Arkani-Hamed N., Dimopoulos S., Dvali G. (August 2000). “The Universe’s Unseen Dimensions”. Scientific American 283 (2): 62–69.

Bork A. (1964), The Fourth Dimension in Nineteenth-Century Physics, Isis 181.

Bragdon C.F.(1913) A Primer of Higher Space (The Fourth Dimension), Cosimo Classics, 2005.

Brumblay, R.J. (2003) Hyperdimensional perspectives in Out-of-Body and Near-Death Experiences. Journal of Near-Death Studies, 21, 201-221.

Carr, B. (2008). Worlds apart? Proceedings of the Society for Psychical Research, 59, 1–96.

Dalrymple Henderson L. (1983) The Fourth Dimension and Non-Euclidean Geometry in Modern Art, Princeton University Press.

Droulez T. (2010), Conscience, espace, réalité. Implications d’une critique du réalisme perceptuel direct, Cahiers Philosophiques de Strasbourg, n°28 .

Durrel F. (1938), The fourth Dimension : an Efficiency Picture, in Mathematical Adventures, Boston, Bruce Humphries.

Freund, P.G.O. (1982). Kaluza-Klein Cosmologies. Nucl.Phys.B 209 (1): 146.

Freund, P.G.O. (1985). Superstrings from Twenty-six-Dimensions?. Phys.Lett.B 151 (5-6): 387–390

Gardner M. (1981), Parapsychology and quantum Mechanics, in Abell G. & Singer B, Science and the Paranormal: Probing the Existence of the Supernatural, New York, Charles Scribner's Sons.

Greene, B. (2003) The Elegant Universe: Superstrings, Hidden Dimensions, and the Quest for the Ultimate Theory. W.W. Norton & Co.

Hawking, S. (2001), The Universe in a Nutshell (London: Bantam Press).

Holden J. M., (2009) Veridical perception in Near-Death Experiences: A Comprehensive, Critical Review of the Professional Literature. . In J. M. Holden, B. Greyson, & D. James (Eds.), The handbook of near-death experiences: Thirty years of investigation (pp. 185-212). Santa Barbara, CA: Praeger/ABC-CLIO.

Holden J. M., Greyson B., & James D. (Eds.), The handbook of near-death experiences: Thirty years of investigation, Santa Barbara, CA (2009): Praeger/ABC-CLIO.

Holden, J. M., & Joesten, L. (1990). Near-death veridicality research in the hospital setting. J.Near-Death Studies 9 (1): 45–54.

Joseph, R. (1996). Neuropsychiatry, neuropsychology, clinical neuroscience. Lippincott Williams & Wilkins.

Joseph, R. (2001). The limbic system and the soul. Zygon, 36, 105-136.

Jourdan J.P., Juste une dimension de plus. Cahiers scientifiques de IANDSFrance. Hors Série N°1 Février 2000. English version: « Just an extra dimension » http://iands-france.org.pagesperso-orange.fr/SRC/PDF/justextra.pdf

Jourdan J.P., Les dimensions de la conscience. Les Cahiers de IANDSFrance. N°7 Janvier 2001.

Jourdan J.P., (2006) Deadline Dernière limite. Les 3 Orangers, Paris 2006; Pocket Paris 2010.

Kaluza T. (1921), On the problem of unity in physics, Sitzungsber. Preuss. Akad. Wiss. Berlin. (Math. Phys.) 966-972.

Kant E. 1783, Prolégomènes à toute métaphysique future, Paris, Librairie Philosophique J. Vrin, 1968.

Keeton, C. R., and Petters, A. O. (2005). Formalism for testing theories of

gravity using lensing by compact objects. III. Braneworld gravity. Physical Review D 73:104032.

Klein O. (1926), « Quantum theory and five dimensional theory of relativity », Z. Phys. 37 895-906.

Manning H.P. (1914), Geometry Of Four Dimensions, New York, Dover 1956.

Nottale, L., (1993) "Fractal Space-Time and Microphysics: Towards a Theory of Scale Relativity" (World Scientific).

Nottale L., (2010). "Scale Relativity and Fractal Space-Time. A New Approach to Unifying Relativity and Quantum Mechanics" (Imperial College Press, in press).

Nottale L. and Timar P., (2008), in « Simultaneity : Temporal Structures and Observer Perspectives », Susie Vrobel, Otto E. Rossler, Terry MarksTarlow, Eds., (World Scientific, Singapore), Chap. 14, p. 229-242.

Parnia S., Waller D.G., Yeates R., Fenwick P., A qualitative and quantitative study of the incidence, features and aetiology of near death experiences in cardiac arrest survivors. Resuscitation 48 (2001); 149-156.

Randall, L., and Sundrum, R. (1999a). Large Mass Hierarchy from a Small Extra Dimension. Phys. Rev. Lett. 83, 3370–3373.

Randall L., Sundrum R (1999b), An alternative to compactification, Phys. Rev. Lett.83, 4690-4693,.

Ring K. (1980) Life at Death: A scientific investigation of Near-Death Experience. New York,NY: Coward,McCann and Geoghegan.

Ring K., Cooper S., (1997). Near-Death and Out-of-Body Experiences in the Blind: a study of apparent eyeless vision. Journal of Near Death Studies, (2), 101-147.

Rucker R. (1977), Geometry, Relativity and the Fourth Dimension , Dover.

Rucker R. (1984), The Fourth Dimension, Houghton Mifflin.

Sabom M.B., (1981) Recollections of Death: A Medical Investigation, Bantam.

Sabom M.B., (1998) Light and Death: One doctor's fascinating account of neardeath experiences. Grand Rapids, MI; Zondervan.

Schwaninger J. & al., (2002). A prospective analysis of Near-Death Experiences in cardiac arrest patients. Journal of Near Death Studies, 20 (4), 215-232.

Sartori P. (2004) A prospective study of NDEs in an intensive therapy unit. Christian parapsychologist, 16, 34-40.

Sartori P. (2006) A long-term prospective study to investigate the incidence and phenomenology of near-death experiences in a Welsh intensive therapy unit. Network review, 90, 23-25.

Sartori P., et al., (2006) A Prospectively Studied Near-Death Experience with Corroborated Out-of-Body Perceptions and Unexplained Healing. Journal of Near Death Studies Vol. 25 (2), Winter.

Smit H.R., (2008). Corroboration of the dentures anecdote involving veridical perception in a Near-Death Experience, Journal of Near-Death Studies, 27 (1), Fall .

Smythies J. (1994). The Walls of Plato's Cave: The Science and Philosophy of Brain. Consciousness and Perception. Avebury Press.

Smythies J. (2003). Space, time and consciousness. Journal of Consciousness Studies, 10, 47–56.

Smythies J. (2009) Brain and Consciousness: The Ghost in the Machines. Journal of Scientific Exploration, Vol. 23, No. 1, pp. 37-50.

Van Lommel Pim & al., (2001). Near-Death Experience in survivors of cardiac arrest : a prospective study in the Netherlands. The Lancet, vol 358, décembre.

Willink A. (1893). Th World of the unseen : An Essay on the Relation of Higher Space to Things Eternal, New York, Macmillan.

Zollner J.C.F. (1901). Transcendental Physics, Boston, Beacon of Light Publishing.

6. Consciousness: Shared Consciousness, Twin Consciousness, Dissociation, Near Death

L. Dossey[1], B. Greyson[2], P.A. Sturrock[3],
and J. B. Tucker[4]
[1]Explore, Santa Fe, NM 87501 [2]University of Virginia Health System, Division of Perceptual Studies, Charlottesville, VA 22902 [3]Center for Space Science and Astrophysics, Stanford University, Stanford, CA 94305
[4]University of Virginia Health System, Division of Perceptual Studies, Charlottesville, VA 22902

Abstract

Conventionally, there is a tendency to view consciousness as simply a property or activity of the brain. One can explain a lot about consciousness in this way – but not everything. In this article, we draw attention to certain aspects of consciousness that resist the conventional interpretation including, in particular, out-of-body experiences, past-life memories, the apparent linked consciousnesses of twins, and healing at a distance.

1. INTRODUCTION

Oscar Wilde began a mini-essay with the words "Ah! Meredith! Who can define him?" (Wilde, 1889) Perhaps we should begin this essay with "Ah! Consciousness! Who can define it?" However, before discussing consciousness, it may be helpful to distinguish two different types of science.

What we might call "Type I" science is a "forward" or "deductive" process, in which we begin with agreed concepts and an established base of knowledge such as physical laws, and explore the consequences. The bulk of "everyday science" seems to fall into this category.

What we might call "Type II" science is a "reverse" or "inductive" process in which, beginning with a phenomenon that is not understood and handicapped by the absence of useful concepts, we attempt to establish appropriate concepts and then derive the principles governing the phenomenon. Major paradigm shifts such as quantum mechanics belong in this category.

In discussing a complex problem such as consciousness, it makes a huge difference which scientific approach one adopts. Following the pattern of Type I science, it is natural to begin with the brain and to examine the possibility that consciousness can be fully understood as a brain activity. This approach is by no means straightforward, and raises challenging problems. If you had terminal health problems, a future surgeon might be able to remove your brain and implant it in the healthy body of some young person who had just been killed. Then we would suppose that, when you wake up from the operation, you recognize your own mind with its memories and peculiarities, and are happy to see that you now have a handsome, strong, and healthy young body.

But now let us fast-forward one hundred thousand years, when computers can read everything in your brain, and use that information to program another brain to have precisely the same informational structure and content as your original brain. Now, when you wake up from that operation, where are you? If you are in one body, which is it? Or can you be in both bodies at the same time? We see that there may be conceptual problems with the consciousness-is-brain-activity hypothesis.

However, to return to our main theme—the nature of consciousness, it is important to note that we do not test a hypothesis by looking for more and more facts that are in agreement with that hypothesis. On the contrary, we test a hypothesis by carefully searching for facts that are incompatible with that hypothesis. If no such facts come to light, the case for the hypothesis is greatly strengthened. If such facts do come to light, the hypothesis must be abandoned or at least modified.

The purpose of this article is to highlight four phenomena that appear to be incompatible with the consciousness-is-brain-activity hypothesis. One of these comprises "out-of-body" experiences (OBEs), in which a person reports being separated from his or her body and acquiring information that it would have been impossible for the person to obtain by normal means. This topic is discussed in Section 2. A second topic is reincarnation, indicated by evidence that a child remembers a previous life, when careful investigation finds correspondences between the child's memories and facts concerning the "previous personality." This topic is discussed in Section 3. We discuss evidence for interactions between consciousnesses in Section 4, healing at a distance in Section 5, and offer some concluding thoughts in Section 6.

2. OUT-OF-BODY EXPERIENCES

In out-of-body experiences (OBEs), a person's consciousness is experienced as having separated from the body. A tentative estimate is that at least 10% of the 5/26 general population have experienced one or more OBEs (Alvarado, 2000, pp. 184– 186). Models of consciousness that link it inextricably with the brain have included neural mechanisms to account for the experience of being out of the body and perceiving events as if from a different location. Sometimes these proposed mechanisms have been taken to imply that out-of-body experiences are nothing more than hallucinations or illusions produced by altered brain physiology (Churchland, 1986; Crick,

1994; Pinker, 1997).

For example, Joseph (1999, 2001, 2009) has written extensively about the role of hyperactivation of the amygdala, hippocampus, and inferior temporal lobe in splitting consciousness from the body under traumatic circumstances. However, Joseph prudently acknowledged that these neuroanatomical data are ambiguous with regard to whether altered brain physiology causes out-of-body sensations that are merely hallucinatory or, alternatively, whether it enables the mind truly to separate from the body, permitting accurate out-of-body perceptions that accord with external reality (Joseph, 2001, p. 132). If out-of-body perceptions are merely hallucinatory, then the neurophysiological findings elaborated by Joseph and others may provide sufficient explanation. Even if out-of-body perceptions are not hallucinatory, but are in fact veridical representations of external reality beyond the reach of the senses, these neurophysiological models may still contribute significantly to our understand of the phenomenon. But in the latter case, they do not provide sufficient explanation without some further explication of the mindbody relationship (Kelly et al., 2007).

Many out-of-body perceptions are entirely subjective, providing no evidence that the person actually separated from the body, rather than simply imagined separating. However, in other cases experiencers report that, while out of the body, they became aware of events either occurring at a distance or that in some other way would have been beyond the reach of their ordinary senses. Some of these accurate perceptions included unexpected or unlikely details, such as a woman in childbirth who reported being out of her body and seeing her mother, a non-smoker, smoking a cigarette in the waiting room (Cook, Greyson, & Stevenson, 1998, p. 391). Notably, Ring and Cooper (1999) reported 31 cases of blind individuals (nearly half of them blind from birth) who experienced during their OBEs quasi-visual and sometimes veridical perceptions of objects and events.

A frequent criticism of these reports of perceptions of events at a distance from the body is that they often depend on the experiencer's testimony alone. The paucity of corroborating testimony in many cases has encouraged commentators to dismiss such reports cases as anecdotal. However, some cases have been corroborated by others (e.g., Clark, 1984; Hart, 1954; Ring & Lawrence, 1993). Van Lommel et al. (2001, p. 2041), for example, reported a case in which a cardiac arrest victim was brought into the hospital

comatose and cyanotic, and even after restoration of his circulation he remained in a coma and on artificial respiration in the intensive care unit for more than a week. When he regained consciousness and was transferred back to the cardiac care unit, he immediately recognized one of the nurses, saying that this was the person who had removed his dentures during the resuscitation procedures. He said further that he had watched from above the attempts of hospital staff to resuscitate him in the emergency room, and he described "correctly and in detail" the room and the people working on him, including the cart in which the nurse had put his dentures. The nurse corroborated and verified his account. Cook, Greyson, & Stevenson (1998, pp. 399–400) reported a case of this type in which a patient undergoing open-heart surgery described leaving his body and watching the cardiac surgeon "flapping his arms as if trying to fly." The surgeon verified this detail by explaining that after "scrubbing in", and to keep his hands from possibly becoming contaminated, he had flattened his hands against his chest, while rapidly giving instructions to the surgical interns by pointing with his elbows.

A dramatic OBE from the 19th century involved Mr. Wilmot and his sister Eliza who were traveling by ship from Liverpool, England, to New York in a severe storm (Sidgwick, 1891, pp. 41-46). More than a week after the storm began, Mr. Wilmot's wife in Connecticut, worried about the safety of her husband, had an experience while she was awake during the middle of the night, in which she seemed to go to her husband's stateroom on the ship, where she saw him asleep in the lower berth and noticed another man in the upper berth looking at her. She hesitated, kissed her husband, and left. The next morning, Mr. Wilmot's roommate asked him somewhat indignantly about the woman who had come into their room during the night. Eliza Wilmot corroborated this story, saying that the next morning, before she had seen her brother, his roommate asked her if she had been in to see Mr. Wilmot during the night, and when she replied no, he said that he had seen a woman come into their room in the middle of the night and kiss Mr. Wilmot.

Of course, not all OBEs are veridical in nature, and most provide no evidence of anything more than a subjective experience. Nonetheless, some OBE reports are corroborated by independent observers; the Wilmot case is not unique (see, e.g, Cook, Greyson, & Stevenson, 1998; Kelly, Greyson, & Stevenson, 1999–2000). Hart (1954) analyzed 288 published OBE cases in which persons reported perceiving events that they could not have perceived

in the ordinary way. In 99 of these cases the events perceived were verified as having occurred, and the experience had been reported to someone else before that verification occurred. A type of OBE that particularly strains models that link consciousness inextricably to the brain involves "reciprocal apparitions," again exemplified by the Wilmot case. In such cases, while one person is having an OBE, or having a dream in which he or she seems to go to a distant location, a person at that location, unaware of the first person's experience, sees an apparition of that person. Hart (1954) summarized 30 such cases that had been published up to that time (see also Hart & Hart, 1933). In one unpublished case from the University of Virginia collection, a nurse became friends with a quadriplegic man who required several hospitalizations for pneumonia and other complications. During one of these hospitalizations, the nurse, feeling guilty that she had not recently visited this patient, had a dream in which she seemed to go to him in the hospital, stood at the end of his bed, and told him to keep fighting.

Shortly afterward, the patient's sister told this nurse that he had reported seeing her standing at the foot of his bed, telling him to keep fighting.

A few individuals may have OBEs repeatedly or voluntarily, making them potentially amenable to observation under controlled conditions. Tart (1968) studied a woman who was able, while monitored by EEG in the laboratory, to have an OBE in which she read a five-digit number that was randomly selected and placed as a target on a shelf out of range of her normal sight. In another experiment, a person who could induce OBEs at will attempted during randomly selected periods to go to a specified location during an OBE and influence a variety of detectors located there, including his pet kitten, which showed significantly less movement and less vocalizing during the OBE periods than during the control periods (Morris, et al., 1978). Osis and McCormick (1980) tasked another person who claimed to induce OBEs at will to view a randomly-generated target that appeared as an illusion visible only from one particular point in space. Unbeknownst to the subject, a strain gauge sensor was situated at that location. The strain gauge activation was significantly higher during hits than during misses. These experiments, as well as the spontaneous reciprocal apparitions described above, suggest that veridical OBE perception may be objectively real, implying that some aspect of consciousness can under certain circumstances separate from the physical body.

3. REINCARNATION CHILDREN'S REPORTS OF PAST-LIFE MEMORIES

Children's reports of memories of previous lives have been the subject of systematic study for the last fifty years (Stevenson, 2001). Beginning with Stevenson, a number of researchers have now collected over 2,500 cases. Though easiest to find in cultures with a general belief in reincarnation, cases have been identified all over the world, including in the U.S. (Tucker, 2005) and in Western Europe (Stevenson, 2003). The strongest cases have included statements that have been verified to 9/26 accurately describe the life of one particular deceased individual. The following is one example.

The Case of Kumkum Verma. Stevenson (1975) reported the case of Kumkum Verma, a girl in India who began talking about a previous life when she was three years old. She said she had lived in a place called Darbhanga, a city of 200,000 people 25 miles from her village. She described a life as a woman there and named the section of the city where she said she had lived, a commercial district of artisans and craftsmen. She gave numerous details, and her aunt made notes of some of Kumkum's statements six months before any attempt was made to verify them. Though some of the notes were lost, Stevenson obtained a partial list and had it translated into English. It revealed 18 statements from Kumkum, all of which matched the life of a blacksmith's wife who died in Darbhanga five years before Kumkum was born. These included the name of the city section, her son's name and the fact that he worked with a hammer, her grandson's name, the name of the town where her father lived, the location of his home near mango orchards, and the presence of a pond at her house. Also included were personal details that were accurate for the deceased woman, with Kumkum saying she had an iron safe at her house, a sword hanging near her cot, and a snake near the safe to which she fed milk.

Kumkum's family noted that she used some unusual expressions and spoke with an accent, both of which they associated with the lower classes of Darbhanga. Kumkum appeared to have had no access to the information about the woman through normal means. By all accounts, the two families involved had been completely unknown to each other and were separated not only by distance but also by social class, as Kumkum's father was an educated landowner.

The children in these cases generally begin talking about a previous life at an early age, with the average being 35 months. They usually stop by the age of six or seven. They typically start their past-life talk spontaneously with no urging from their parents. Indeed, parents often try to get the children to stop talking about a past life, even in places with a general belief in reincarnation. The children usually describe recent, ordinary lives, with the one exceptional aspect of the life frequently being the death, as many of the previous individuals died at an early age and 70% died by unnatural means. Some children say they were deceased family members, but others report being strangers at other locations as Kumkum did. Almost all describe a previous life in the country in which they live, though some report being soldiers of another nationality who were killed in the child's home country during a war. This includes 24 Burmese children who said they had been Japanese soldiers killed in Burma during World War II, a claim parents would have been most unlikely to encourage given how despised the Japanese Army was there (Stevenson & Keil, 2005).

Along with their statements, many of the children show behaviors that appear associated with their apparent memories. They often show strong emotions about the previous life and also emotions appropriate for the relationship the previous person had with different individuals, being deferential toward the previous husband, for instance, but bossy toward the previous person's younger siblings. Other behaviors include phobias, with the children showing intense fears related to the mode of death in 35% of the unnatural death cases (Tucker, 2005). Many of the children also show themes in their play that appear connected to their apparent memories. This most often involves acting out the occupation of the previous person, with some children engaging compulsively in such play for hours on end.

It is significant to note that a number of the children had birthmarks or birth defects that matched wounds—usually the fatal wounds—on the bodies of the previous individuals. Stevenson (1997) published a collection of 225 such cases that included a variety of dramatic or unusual defects. These included stubs for the fingers of only one hand—when the previous person had lost the fingers of one hand in a fodder chopping machine—and an underdeveloped side of the face of one child with only an accompanying stump for an ear—when the previous person had been shot in the side of the head at close range. Stevenson listed 18 cases in which children had double

birthmarks, corresponding to both the entrance and exit wounds suffered by gunshot victims.

Such marks are reminiscent of work in other areas demonstrating that mental images can produce specific somatic effects in at least some individuals, such as hypnotized subjects who develop blisters after being told they are being burned by a hot object (Gauld, 1992). The birthmarks and birth defects are consistent with a process in which the consciousness of the previous individual, containing the final mental images from the previous life, affects the development of the fetus and produces defects similar to the wounds that individual had suffered. In sum, the children appear to possess memories, emotions, and mental images that previously belonged to a deceased individual. Though the mechanism that might enable their transfer to a new body remains to be understood, the cases provide evidence for the persistence of consciousness after death.

4. LINKED CONSCIOUSNESS IN TWINS

Another area that provides evidence that consciousness is not confined to the brain involves cases of twins who appear to share a non-physical connection. This phenomenon is most thoroughly described in Playfair (2008). Some examples follow.

A student at Stony Brook University awoke out of a deep sleep at 6 a.m. and cried out that her twin sister was in trouble. She told her roommate and soon called her mother. She learned that at the time she woke up, a bomb had exploded outside her sister's apartment in Arizona, shattering her window and leading her and her husband to rush out of the building (Playfair, 2008, p. 60).

A young girl was with her mother in the kitchen of their house when she suddenly said, "Hurry, Elizabeth has fallen off Jack's bicycle and hurt her knee!" Her mother followed her as she ran out of the house and down the road, where they found her twin sister still lying on the ground where she had fallen (Gaddis & Gaddis, 1972, pp. 99-100).

A set of twins, a physician and a London banker, reported that as teenagers, one of them was walking down a road when she felt threatened by a car that kept turning around and approaching her. The girl became panicked and started to run. She imagined her sister and thought, "Alison, if there's anything you can do, tell Dad to come quick!" Alison, at home studying in

the room the two girls shared, suddenly felt as if her sister was there. She reported experiencing "a feeling of real panic— like 'Get Dad! Get Dad!' I suddenly knew there was something wrong with Aily" (Playfair, 2008, p. 53).

The connections at times appear to manifest somatically rather than mentally. The girls in the last example seemed to share pain at times. One tripped in a pothole during a run and sprained her ankle. At that moment, her sister experienced a sudden burning sensation that started in her feet and then spread over her body. Another time, one of them was in bed when she experienced pain in her nose so severe she got up and took a painkiller. At the same time sixty miles away, her sister was in a pool when another swimmer shot up from the bottom and hit her in the face, breaking her nose (Playfair, 2008, pp. 53-54).

In another case, a woman who had moved to Japan phoned her twin and asked her to send some bras because her breasts had become tender and swollen. Later that day, her symptoms led her to wonder if her sister was pregnant, and by the time they spoke again later that week, her sister could confirm that indeed she was (Playfair, 2008, pp. 51-52).

Such reports are not rare. In a survey in which 600 twins or parents of twins completed questionnaires, 183 reported either experiences that might be explained 13/26 by reading each other's minds or instances of being surprised by having the same illness or pain simultaneously (Rosambeau, 1987). Such connections can appear evident at a very early age. One example involved 3 day-old twins, where one began shrieking and shaking as his brother was face down in pillows and turning blue, the child's screams saving his brother's life (Playfair, 2008, pp. 44-45).

It may not be surprising then that apparent connections can occur in twins separated in infancy. The Minnesota Study of Twins Reared Apart involved 135 pairs, including the "Jim twins" (Segal, 1999, pp. 116-118). Reared by different adoptive families in Ohio and reunited at age 39, they were both named Jim and had been married twice, first to a woman named Linda and then to a woman named Betty. They had sons with the same name (though different spellings): James Alan and James Allan. As children, they each had a dog named Toy. They had taken family vacations to the same three-block strip of Florida beach (without ever meeting), both arriving in light blue Chevrolets. Both worked part-time as sheriffs, and they consumed the same brand of cigarettes and the same brand of beer.

Since such similarities can hardly be ascribed to genetics, one might be inclined to blame simple coincidence. That explanation becomes more strained when considering the American twins who, reunited at age 25 after being raised in dissimilar environments, discovered they both used the same rare Swedish toothpaste (Segal, 1999, p. 119). Such cases suggest a persistent non-physical linkage in some twins, even those who are reared apart from each other.

5. CONNECTIONS BETWEEN CONSCIOUSNESSES, AND HEALING AT A DISTANCE

In Section 2 and 3, we have presented evidence suggesting that consciousness has an existence independent of the body—and therefore independent of the brain. But what properties could one or should one assign to that consciousness other than the fact that it is in some way related to, or perhaps comprises, someone's "personality" or "essential identity"? In particular, can there be a linkage between the consciousnesses of two different individuals?

This leads one to the consideration of evidence concerning "ESP" or "extrasensory perception," for which there is voluminous experimental evidence. [See, for instance, Bem (2011), Jahn and Dunne (1987), Radin (1997).] It also leads to another important and relevant area of current research—that of anomalous healing, such as healing brought about by the unknown influence of a healer on a healee who may be in a remote location. According to the conventional view that human consciousness is simply an activity or property of the brain, such healing is impossible. Yet there is abundant evidence that it does in fact occur. In recent years, many researchers have undertaken clinical and laboratory studies designed to answer two fundamental questions: (1) Do the compassionate healing intentions of humans affect biological functions in remote individuals who may be unaware of these efforts? And (2) can these effects be demonstrated in nonhuman processes, such as microbial growth, specific biochemical reactions, or the function of inanimate objects?

The first question is extraordinarily difficult to study (Schwartz and Dossey, 2010). There are studies which demonstrate significant effects of distant healing in cardiopulmonary (Byrd, 1988) and AIDS (Sicher, et.al., 1998) patients, for example. But the methodological and ethical challenges

involved in studying healing effects on humans at a distance are formidable. For instance, in distant healing prayer studies, can it be assumed that the "not prayed for group" really did not receive any prayer or healing thoughts from either themselves or their loved ones?

The second question, whether healing can affect non-human processes, is far easier to address. The pioneering work of Bernard Grad at McGill University set the standards for systematic laboratory work on healing. Most notably, Grad studied the effects of healers on wound healing in mice and the growth rates of "shocked" plants (Grad, 1965). In both areas Grad found that wounded mice healed 15/26 significantly faster after having been treated by a healer, and shocked plants similarly had higher germination and faster growth rates. In more recent times, Bengston and Krinsley (2000) have found that inexperienced skeptical volunteers acting as healers can produce full cures in mice infected with a normally fatal dosage of mammary adenocarcinoma. Subsequent mouse studies using the same mammary adenocarcinoma model also indicated a curious "resonant bonding" between experimental and control mice, so that healing intention directed towards the treated experimental animals somehow also affects the untreated control animals (Bengston and Moga, 2007). It is interesting that these experiments on laboratory mice seem to produce patterns that mimic placebo responses in human studies.

What has been accomplished? In 2003, Jonas and Crawford (2003) found "over 2,200 published reports…and other writings on spiritual healing, energy medicine, and mental intention effects. This included 122 laboratory studies, 80 randomized controlled trials, 128 summaries or reviews, 95 reports of observational studies and nonrandomized trials, [and] 271 descriptive studies, case reports, and surveys…."

How significant are these clinical and laboratory studies? Using the strict CONSORT (Consolidated Standards of Reporting Trials; CONSORT 2010) criteria, Jonas and Crawford gave an A grade to studies involving the effects of intentions on inanimate objects such as sophisticated random number generators. They also gave a high grade (B) to intercessory prayer studies involving humans, and to similar laboratory experiments involving nonhumans such as plants, cells, and animals. In order to relate this phenomenon to brain activity, one would perhaps need to hypothesize some form of radiation that emanates from the brain and somehow influences the

healee. However, if this approach proves not to be fruitful, one could regard this as another phenomenon that, along with OBE's and reincarnation, needs a fundamentally different type of explanation. Recently, for example, Hendricks, Bengston, and Gunkelman (2010) demonstrated interpersonal EEG coupling 16/26 between healer and subject pairs. The healer's EEG data showed harmonic frequency coupling across the spectrum, followed first by between-individual EEG frequency entrainment effects, and then by instantaneous EEG phase locking. The healer produced a pattern of harmonics consistent with Schumann's resonances, with an entrainment of the subject's EEG by the healer's resonance standing waves, and with eventual phase coupling between the healer and healee. The authors speculate that healing may involve a Schumann-resonance-type standing electric field as a connectivity mechanism (Hendricks, Bengston, & Gunkelman, 2010).

6. DISCUSSION

If consciousness is not simply a brain activity, what might it be? One approach is to modify the "brain" concept, and to hypothesize that consciousness is the activity of some other entity. For this purpose, we could reactivate (one might say "resuscitate") the dated and little-used term "soul." We might then suppose that it is the soul that leaves the body and rises in the operating room to view the body from above. We might also suppose that the soul leaves the body of someone who dies, to later reenter a new person who is about to be born. But these may prove to be overly simplistic concepts: just as computing may be carried out either in a desktop computer or in the "cloud", so it may prove that the consciousness associated with one person is intrinsically inseparable from consciousnesses related to additional—perhaps many other—persons.

It is important to keep in mind the extraordinary tentativeness of almost anything that can be said about the nature of consciousness. According to John Maddox (then editor of Nature), "What consciousness consists of...is...a puzzle. Despite the marvelous successes of neuroscience in the past century..., we seem as far from understanding cognitive process as we were a century ago." (Maddox, 1999.) The philosopher Jerry A. Fodor expressed a similar opinion, saying, "Nobody has the slightest idea how anything material could be conscious. Nobody even knows what it would be like to have the slightest idea about how anything material 17/26 could be conscious. So

much for the philosophy of consciousness."(Fodor, 1992) In a similar vein, Stuart Kauffman, the theoretical biologist and complex systems theorist, wrote "Nobody has the faintest idea what consciousness is…. I don't have any idea. Nor does anybody else, including the philosophers of mind." (Kauffman, 2011.)

The need for humility in approaching the subject of consciousness has long been emphasized by theoretical physicists: physics, as currently understood, may not be up to the task of deciphering the nature of the mind. Wigner (1983) expressed the view that "It [physics] will have to be replaced by new laws, based on new concepts, if organisms with consciousness are to be described.… [I]n order to deal with the phenomenon of life, the laws of physics will have to be changed, not only reinterpreted." Penrose (2003) has stated "My position [on consciousness] demands a major revolution in physics…. [T]here is something very fundamental missing from current science. Our understanding at this time is not adequate and we're going to have to move to new regions of science…." Nick Herbert, a physicist, has expressed his thoughts more colorfully: "Science's biggest mystery is the nature of consciousness. It is not that we possess bad or imperfect theories of human awareness; we simply have no such theories at all. About all we know about consciousness is that it has something to do with the head, rather than the foot." (Herbert, 1987.)

Experimental results such as those discussed in precededing sections may point to an unknown mechanism of linkage between consciousnesses. Schrödinger, one of the fathers of quantum mechanics, coined the term "entanglement" (Schrödinger, 1935) and later proposed that the consciousnesses of all individuals are united (Schrödinger, 1969, 1983). "Entanglement" is a property of a quantum-mechanical system containing two or more components that have once been in contact. Even though they may later be separated, they remain linked in such a way that the quantum state of any one of them cannot be adequately described without full consideration of the others (Schrödinger, 1935). Though resisted by Einstein as 18/26 "spooky action at a distance," quantum entanglement has been demonstrated experimentally, including over kilometer distances (Tittel et al. 1998; Nadeau & Kafatos, 1999, pp. 65-82).

Although physicists originally believed entangled states between distant particles were of no practical consequence, evidence now suggests that the

effects of quantum entanglement may "scale up" into our macroscopic world, such as linking separated human neurons in vitro. (See, for instance, Pizzi, et al., 2004.) If separated neurons can be entangled in vitro, might whole brains be entangled at a distance? Several experiments using fMRI and EEG-based protocols suggest that this is the case. In these experiments, the stimulation of one individual's brain appears to be registered simultaneously in a distant individual's brain by fMRI or EEG (Standish et al., 2003, 2004; Wackerman et al., 2003). These experiments suggest that the idea of united, linked minds may be more than philosophical speculation.

For Schrödinger (1935), entanglement was the key insight dividing classical from modern physics. He said, "I would not call … [entanglement] one but rather the characteristic trait of quantum mechanics, the one that enforces its entire departure from classical lines of thought." He further wrote (Schrödinger, 1983): "To divide or multiply consciousness is something meaningless. In all the world, there is no kind of framework within which we can find consciousness in the plural; this is simply something we construct because of the spatio-temporal plurality of individuals, but it is a false construction…. The category of number, of whole and of parts are then simply not applicable to it; the most adequate…expression of the situation is this: the self-consciousness of the individual members are numerically identical with [one an]other and with that Self which they may be said to form at a higher level." He also remarked (Schrödinger 1969): "Mind is by its very nature a singulare tantum. I should say: the overall number of minds is just one."

To paraphrase Schrödinger's statement, one might say that consciousnesses are inextricably entangled. This concept plays an important role in modern psi 19/26 research. According to Radin, "There are theoretical descriptions showing how tasks can be accomplished by entangled groups without the members of the group communicating with each other in any conventional way. Some scientists suggest that the remarkable degree of coherence displayed in living systems might depend in some fundamental way on quantum effects like entanglement. Others suggest that conscious awareness is caused or related in some important way to entangled particles in the brain. Some even propose that the entire universe is a single, selfentangled object." (Radin, 2006, p.1.)

But we must be cautious: Invoking "entanglement" may simply substitute

one mystery for another. While it is true that distant individuals appear to be linked in some sense (for instance in the correlated behaviors of identical twins raised apart, or in apparent healing at a distance), there is as yet no definitive evidence that "human entanglement" is a manifestation of "quantum entanglement." We may be dealing with correspondences in terminology and nothing more. It is important to bear in mind that in studies of apparent remote healing, for instance, factors such as compassion, love, and empathy seem to play a key role (Achterberg et al., 2005), but these factors are not to be found in the equations of quantum physics. Moreover, physicists agree that the nonlocal connections between entangled particles cannot be used to transfer information. (Nadeau & Kafatos, 1999, pp. 80-81.) In contrast, it appears that information can be transferred between distant, entangled humans (as in remote healing; in identical twins raised apart); in correlated fMRI or EEG patterns between distant human beings; or in ostensible telepathic exchanges. (See, for instance, Radin 1997, 2006.) It therefore seems unlikely that "entangled particles" can fully account for the entangled actions and emotions of human beings. For all that, "entanglement" is a useful metaphor for distant correlated human experiences. The fact that entanglement is now recognized to exist at the subatomic quantum level should at the very least encourage us to explore similar (but probably different) phenomena at the human level.

The idea that humans may be linked collectively through space and time is ancient, and is one of the underlying philosophies of several Eastern wisdom traditions. In the West it emerged in the philosophy of Plato, Plotinus, and Swedenborg. It formed the basis of Emerson's view of the Over-Soul. Swiss psychologist Carl G. Jung invoked this view in his concept of the collective unconscious that unites all minds — past, present, and future. However, research concerning consciousness is clearly research of the "Type II" variety. Rather than attempt to develop a theory based on information now in hand, we may be better advised to regard current research on OBEs, reincarnation, and anomalous healing as the beginning of a major long-term program of developing more powerful and more fruitful concepts that can elucidate the nature of consciousness. We have recently pointed out that phenomena such as those discussed in this article, together with other anomalous phenomena, may require a revision of our current "Model of Reality," and that our revised model may involve the concept of hyperspace

(Sturrock, 2009).

ACKNOWLEDGEMENT We wish to acknowledge a valuable contribution from Professor William Bengston, of the Department of Sociology at St. Joseph's College, and helpful suggestions from two referees.

References

Achterberg J, Cooke K, Richards T, Standish L, Kozak L, Lake J., 2005, Evidence for correlations between distant intentionality and brain function in recipients: a functional magnetic resonance imaging analysis. J Alternative and Complementary Medicine, 11(6), 965-971.

Alvarado, C. S., 2000. Out-of-body experiences. In E. Cardeña, S. J. Lynn, & S. Krippner, Eds., Varieties of anomalous experience: Examining the scientific evidence, pp. 183-218, American Psychological Association, Washington, DC.

Bengston, W., & Krinsley, D., 2000. The Effect of the Laying On of Hands on Transplanted Breast Cancer in Mice. Journal of Scientific Exploration, 14, 353-364.

Bengston, William, & Moga, Margaret. 2007. Resonance, Placebo Effects, and Type II Errors: Some Implications from Healing Research for Patients. Experimental Methods. Journal of Alternative and Complementary Medicine, 13, 317-327.

Bem, D. J., 2011. Feeling the Future: Experimental Evidence for Anomalous Retroactive Influences on Cognition and Affect, Journal of Personality and Social Psychology, 100, 407-425.

Byrd, Randolph. 1988. Positive Therapeutic Effects of Intercessory Prayer in a Coronary Care Population. Southern Medical Journal, 81, 826-829.

Churchland, P. S., 1986. Neurophilosophy: Toward A Unified Science Of The Mind/Brain. MIT Press, Cambridge, MA. Clark, K., 1984. Clinical interventions with near-death experiencers. In B. Greyson & C. P. Flynn, Eds., The Near-Death Experience: Problems, Prospects, Perspectives, pp. 242-255. Charles C. Thomas, Springfield, IL.

CONSORT, 2010. Transparent Reporting of Trials. 2010, http://www.consort-statement.org/. Accessed December 9, 2010.

Cook, E. W., Greyson, B., & Stevenson, I., 1998. Do any near-death experiences provide evidence for the survival of human personality after

death? Relevant features and illustrative case reports. Journal of Scientific Exploration, 12, 377-406.

Crick, F. (1994). The Astonishing Hypothesis: The Scientific Search For The Soul. Simon & Schuster, London.

Fodor J., 1992, The big idea: Can there be a science of mind? Times Literary Supplement. July 3, 1992, 5-7.]

Gaddis, V., & Gaddis, M., 1972. The Curious World of Twins. Hawthorn, New York, NY.

Gauld, A., 1992. A History of Hypnotism. Cambridge University Press, Cambridge.

Grad, B. 1965. Some biological effects of the "Laying-On of Hands": A review of experiments with animals and plants. Journal of the American Society for Psychical Research, 59: pp. 95-127.

Hart, H., 1954. ESP projection: Spontaneous cases and the experimental method. Journal of the American Society for Psychical Research, 48, 121-146.

Hart, H., & Hart. E. B., 1933. Visions and apparitions collectively and reciprocally perceived. Proceedings of the Society for Psychical Research, 41, 205-249.

Hendricks, L., Bengston, W., & Gunkelman, J., 2010. The healing connection: EEG harmonics, entrainment, and Schumann's resonances. Journal of Scientific Exploration, 24, 655-666.

Herbert, N., 1987, Quantum Reality, Anchor/Doubleday, Garden City, NY, 249.

Jahn, R. F., & Dunne, B.J., 1987. Margins of Reality: The Role of Consciousness in the Physical World. Houghton Mifflin Harcourt, New York, NY.

Jonas, W.B., & Crawford, C.C. (eds.), 2003, Healing, Intention and Energy Medicine. Churchill Livingstone, New York, NY, pp. xv-xix.

Joseph, R. 1999. The neurology of traumatic "dissociative" amnesia: Commentary and literature review. Child Abuse & Neglect, 23, 715-727.

oseph, R., 2001. The limbic system and the soul: Evolution and the neuroanatomy of 23/26 religious experience. Zygon, 36, 105-136.

Joseph, R., 2009. Quantum physics and the multiplicity of mind: Split-brains, fragmented minds, dissociation, quantum consciousness. J. Cosmology, 3, 600-640.

Kauffman, S., 2011, Quoted in: God enough. Interview of Stuart Kauffman by Steve Paulson. www.salon.com/env/atoms_eden/w008/11/19/stuart_kauffman/index1.html. Accessed February 15, 2011.

Kelly, E. W., Greyson, B., & Stevenson, I., 1999–2000. Can experiences near death furnish evidence of life after death? Omega, 40, 513-519.

Kelly, E. F., Kelly, E. W., Crabtree, A., Gauld, A., Grosso, M., Greyson, B., 2007. Irreducible Mind: Toward a Psychology for the 21st Century. Rowman and Littlefield, Lanham, MD.

Maddox, J., 1999, The unexpected science to come. Scientific American. Dec. 1999; 281(6):62-7.

McFarland, Jefferson, NC. Stevenson, I., & Keil, J., 2005. Children of Myanmar who behave like Japanese soldiers: a possible third element in personality. Journal of Scientific Exploration, 19, 171-183.

Morris, R. L., Harary, S. B., Janis, J., Hartwell, J., & Roll, W. G., 1978. Studies of communication during out-of-body experiences. Journal of the American Society for Psychical Research, 71, 1-21.

Nadeau, R., Kafatos, M., 1999. Over a distance and in “no time”: Bell’s Theorem and the Aspect and Gisin experiments, in The Non-Local Universe, Oxford University Press, New York, NY.

Newman, H. H., 1940. Multiple Human Births. Doubleday, Duran, New York.

Osis, K., & McCormick, D., 1980. Kinetic effects at the ostensible location of an out-ofbody projection during perceptual testing. Journal of the American Society for Psychical Research, 74, 319-329.

Penrose, R., 2003. Quoted in: Karl Giberson. The man who fell to Earth. Interview with Sir Roger Penrose. Science & Spirit. March/April; 2003: 34-41.]

Pinker, S. (1997). How The Mind Works. New York: Norton. Pizzi ,R, Fantasia, A, Gelain, F, Rossetti, D, & Vescovi, A. , 2004. Non-local correlation between separated human neural networks. In: Donkor, E., Pirick, A.R. & Brandt, H.E. (eds.) Quantum Information and Computation II. Proceedings of SPIE. 107-117. 24/26

Playfair, G. L., 2008. Twin Telepathy. (2nd ed.). History Press, Stroud, Gloucestershire, UK. Radin, D. 1997. The Conscious Universe: The Scientific Truth of Psychic Phenomena. HarperEdge, San Francisco, CA.

Radin, D., 2006. Entangled Minds: Extrasensory Experiences in a Quantum Reality, Paraview Pocket Books, New York, NY.

Ring, K., & Cooper, S., 1999. Mindsight: Near-Death And Out-Of-Body Experiences In The Blind. William James Center, Institute of Transpersonal Psychology, Palo Alto, CA

Ring, K., & Lawrence, M., 1993. Further evidence for veridical perception during near-death experiences. Journal of Near-Death Studies, 11, 223-229.

Rosambeau, M., 1987. How Twins Grow Up. The Bodley Head, London.

Schrödinger E., 1935, Discussion of probability relations between separated systems. Mathematical Proceedings of the Cambridge Philosophical Society, 31, 555-563.

Schrödinger E., 1969. What is Life? and Mind and Matter. Cambridge University Press, Cambridge, 145.

Schrödinger E., 1983. My View of the World. Ox Bow Press, Woodbridge, CT, 31-34.

Schwartz, S.A., & Dossey, L., 2010. Nonlocality, intention, and observer effects in healing studies: laying a foundation for the future, Explore (NY), 6, 295-307.

Segal, N. L., 1999. Entwined Lives: Twins and What They Tell Us About Human Behavior. Dutton, New York.

Sicher, F., Targ, E., Moore, D., & Smith, H. 1998. A Randomized, Double Blind Study of Distant Healing in a Population with Advanced AIDS. Western Journal of Medicine, 169(6), 356-363.

Sidgwick, E. M., 1891. On the evidence for clairvoyance. Proceedings of the Society for Psychical Research, 7, 30-99.

Standish, L., Johnson, L.C., Richards, T., & Kozak, L., 2003. Evidence of correlated functional MRI signals between distant human brains. Alternative Therapies in Health and Medicine, 9, 122-128.

Standish, L., Kozak, L., Johnson, C., Richards, T. 2004. Electroencephalographic 25/26 evidence of correlated event-related signals between the brains of spatially and sensory isolated human subjects. J. Alternative and Complementary Medicine 10, 307-314.

Stevenson, I., 1975. Cases of the Reincarnation Type. Volume 1, Ten Cases in India. Charlottesville, VA: University Press of Virginia.

Stevenson, I., 1997. Reincarnation and Biology: A Contribution to the

Etiology of Birthmarks and Birth Defects. Praeger, Westport, CT.

Stevenson, I., 2001. Children Who Remember Previous Lives: A Question of Reincarnation, rev. ed. McFarland, Jefferson, NC. Stevenson, I., 2003. European Cases Of The Reincarnation Type.

Sturrock, P.A., 2009. A Tale of Two Sciences, Exoscience, Palo Alto, CA.

Tart, C. T., 1968. A psychophysiological study of out-of-body experiences in a selected subject. Journal of the American Society for Psychical Research, 62, 3-27.

Tittel, W., Brendel, J., Zbinden, H., & Gisin, N., 1998. Violation of the Bell inequalities by photons more than 10km apart. Physical Review Letters, 81, 3563-3566.

Tucker, J. B., 2005. Life Before Life: A Scientific Investigation of Children's Memories of Previous Lives. St. Martin's Press, New York, NY.

Van Lommel, P., van Wees, R., Meyers, V., & Elfferich, I., 2001. Near-death experiences in survivors of cardiac arrest: A prospective study in the Netherlands. Lancet, 358, 2039-2045.

Wackerman, J, Seiter, C, Keibel, Walach, H., 2003. Correlations between brain electrical activities of two spatially separated human subjects. Neuroscience Letters, 336, 60-6

Wigner, E. P., 1983. Remarks on the mind-body problem. In: Quantum Theory And Measurement (John Wheeler and Zurek Wojciech, eds.) Princeton University Press, Princeton, NJ, p. 99.

Wilde, O., 1889. The Decay of Lying.

7. In the Borderlands of Consciousness and Dreams: Spirituality Rising from Consciousness in Crisis

Kevin R. Nelson, MD
Professor of Neurology, University of Kentucky, Lexington, KY 40536

Abstract

Through understanding consciousness in crisis, we see that spirituality is inextricably bound to our primal brain. During crisis, the border between conscious states and the border between these states and unconsciousness can blur, creating borderlands of consciousness. Emerging from these borderlands comes some of our most powerful experiences.

KEY WORDS: Near-death, consciousness, REM consciousness, "fight-or-flight", syncope, locus coeruleus, arousal, consciousness borderlands

"And his pure brain, which some suppose the soul's frail dwelling-house" -William Shakespeare (King John, Act VI Scene VII)

"All mental processes, even the most complex psychological processes, derive from operations of the brain" Eric R. Kandel (1998) Nobel Laureate

1. Introduction

The brain is our most glorious organ. To survey the majesty of human achievement is to survey the brain's majesty. Plato's philosophy, Shakespeare's plays, Beethoven's symphonies, and Einstein's theories are but a few of the brain's triumphs that come readily to mind. And in our most sublime moments, spirituality must be touching the brain if we seriously consider the words of Shakespeare and Kandel. The brain's grandeur and power is dazzling, yet at the same time this splendor blinds us to the brain's prime purpose-to keep us alive.

Key to this primal role, the brain tightly regulates it's own blood supply each second of life. The brain depends on aerobic metabolism, and so must control its blood flow at rest, in exercise, as well as during physiological and emotional stress. Cerebral blood flow is maintained through the arterial baroreflex (Benarroch, 2008) that in turn relies on the yoked opposition of cholinergic and adrenergic neurons in the peripheral and central nervous

systems, as well as mechanisms intrinsic to the cerebrovasculature (Deegan et al., 2010).

Fading cerebral blood flow with looming unconsciousness signals a crisis to the brain. When the brain finds itself in crisis, we will see how it calls upon crucial impulses that have guided our forbearers' survival for tens upon tens of millions of years.

2. Consciousness in Crisis

One such crisis is near-death experience, whose frequent cause includes transient cardiac dysrhythmia. For reasons beyond biology alone, near-death has become a social stereotype of going through a tunnel, being enveloped by "the light", and floating above one's body, often combined with transcendental or mystical elements. Each near-death experience is colored by the person's life experiences and psychology. Philosopher Sir Alfred Ayer recounts, while near-death, that he had crossed the River Styx, writing afterwards "I have not wholly put my classical education behind me" (Ayer, 1988). Carl Jung visualized burning lamps surrounding a door leading to the inside of a stone temple during his near-death, and the psychiatrist later remarked that "I had once actually seen this when I visited the Temple of the Holy Tooth at Kandy in Ceylon" (Jung and Jaffé, 1989).

Whereas some Americans have sighted Elvis in their near-death experiences (Moody, 1987), Elvis is not featured in experiences of children nor in adults of other cultures (Morse et al., 1986, Pasricha and Stevenson, 1986).

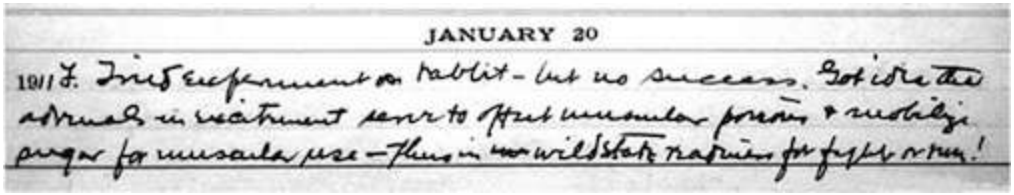
Although there is little mention of near-death experience by William James, near-death does meet his conception of a spiritual experience whereby "feelings, acts and experiences" touch "whatever they may consider the divine" (James and Marty, 1982).

All the clamor over near-death has blinded us, until recently, to the fact that first and foremost near-death experience is consciousness in crisis (Nelson et al., 2006).

3. The Brain's Three Conscious States

There are three mental states possible for the brain: waking, REM sleep and non-REM sleep. We expect in crisis to be awake and attentive so we can meet the danger head on. This is so intuitively obvious that it's rarely given

thought. But the brain must not take for granted that it will be in the right conscious state during crisis. Waking consciousness must immediately orient attention to whatever is required for survival, and so consciousness must be in lock step with "flight-or-fight" action. It is the brain (specifically the limbic system) that orchestrates the "fight-or-flight" to survive (figure 1).


JANUARY 20

1911 F. Tried experiment on rabbit - but no success. Got idea that the adrenals in excitement serve to affect muscular power & mobilize sugar for muscular use — Thus in wild state readies for fight or run!

Figure 1. On Friday January 20, 1911 Walter B. Cannon wrote three lines in his laboratory journal: "Tried experiment on rabbit-but no success. Got idea that the adrenals in excitement serve to affect muscular power and mobilize sugar for muscular use-thus in wild state readies for fight or run!" (Cannon, 1923-2003) with permission. Cannon's critics soon turned "run" into "flight", making the phrase "fight-or-flight" similar to one used earlier by Cannon's most renown teacher, William James.

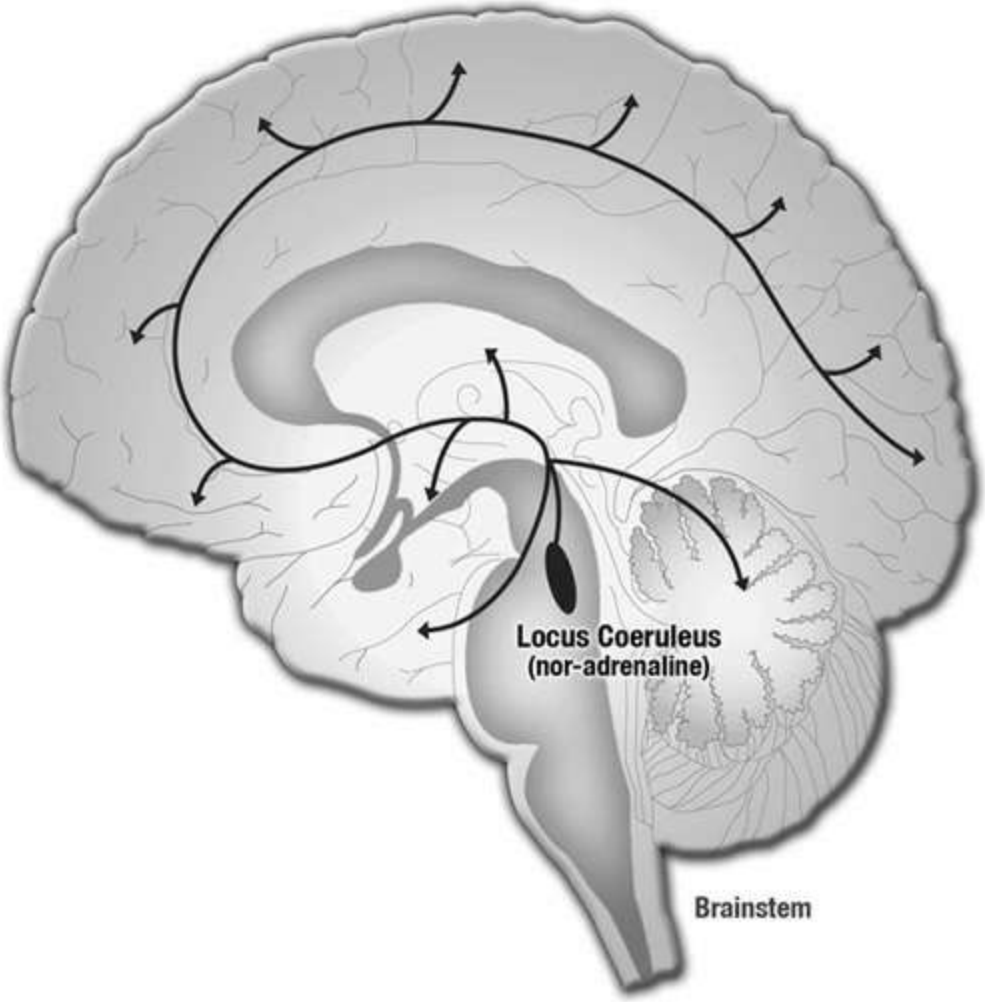


Figure 2. The locus coeruleus is a miniscule cluster of approximately 16 thousand neurons in the right and left pons. Through it's diffuse projections, the locus coeruleus is the nearly exclusive source of the neurotransmitter nor-epinephrine (nor-adrenalin) for almost every region of the brain (Nelson, 2011).

4. The First Borderland of Consciousness '

The border between consciousness and unconsciousness is not always abrupt and absolute. Between the hazy edges of consciousness and unconsciousness lies the first borderland of consciousness entered by someone whose brain is ischemic, starving for blood. The brain is in crisis if blood flow drops below the threshold of 23cc/100 grams of brain/minute, whereupon the cerebral cortex fails (Jones et al., 1981), and consciousness is

lost after ten seconds or so (Brenner, 1997).

Consciousness can come and go if cerebral blood flow waxes and wanes across this threshold, which often happens in clinical settings.

Neuronal death begins within minutes after cerebral blood flow completely ceases. But even with sustained flow there is a second threshold below which neurons die. This threshold increases over hours to eventually reach a plateau of 17 to 18 ml/100 grams of brain/minute (Jones et al., 1981).

In the initial seconds of failing blood flow and fading consciousness, there is no reason to expect that the brain reacts differently between simple syncope and cardiac dysrhythmia. This explains why in a series of near-death subjects, otherwise harmless syncope was the most common event leading to near-death (Nelson et al., 2006). Even in the controlled safety of the laboratory, the syncope experience can be nearly indistinguishable from near-death (Lempert et al., 1994a), which reinforces the finding that only half of those experiencing near-death are actually medically threatened (Owens et al., 1990). Together these observations clash with the popular misconception that the near-death experience happens only in the face of truly eminent death. Upwards of one third of people faint within their lifetime, often while feeling endangered, and this makes syncope potentially fertile ground for spiritual experience.

5. A Metronome of Waking Consciousness

Epinephrine (adrenaline) in the body, and the corresponding neurotransmitter nor-epinephrine (nor-adrenaline) in the brain serve vital functions when peril confronts us. Elemental to “fight-or-flight” behavior is the brain’s source of norepinephrine, the locus coeruleus (LC). From the brainstem pons, LC neurons project widely throughout the brain to help regulate consciousness and actively promote behaviors critical to survival (figure 2).

The pontine arousal system is the fulcrum of a reciprocal swing between colossal neurochemical systems that sweep through the brain (Hobson et al., 1975). The REM promoting cholinergic pedunculopontine (PPT) and laterodorsal tegmental (LDT) nuclei (figure 3), are in counterbalance to the waking actions of the serotonergic dorsal raphe (DR) and noradrenergic LC nuclei.

The locus coeruleus constantly discharges during waking consciousness.

In primates, LC discharges are tightly linked to specific behaviors. There is some evidence to suggest that the firing patterns of this tiny nucleus anticipate certain primate behaviors. Low discharge rates correspond to low arousal when the animal is inattentive to the world around it. Moderate rates (with synchronized bursts) are seen with focused attention. High LC discharge rates correlate to the animal visually scanning the environment and rapidly shifting its attentiveness (Aston-Jones et al., 2000). Swiftly directing attention to meet the demands of the outside world is a fundamental role for the LC (Benarroch, 2009) (figure 4).

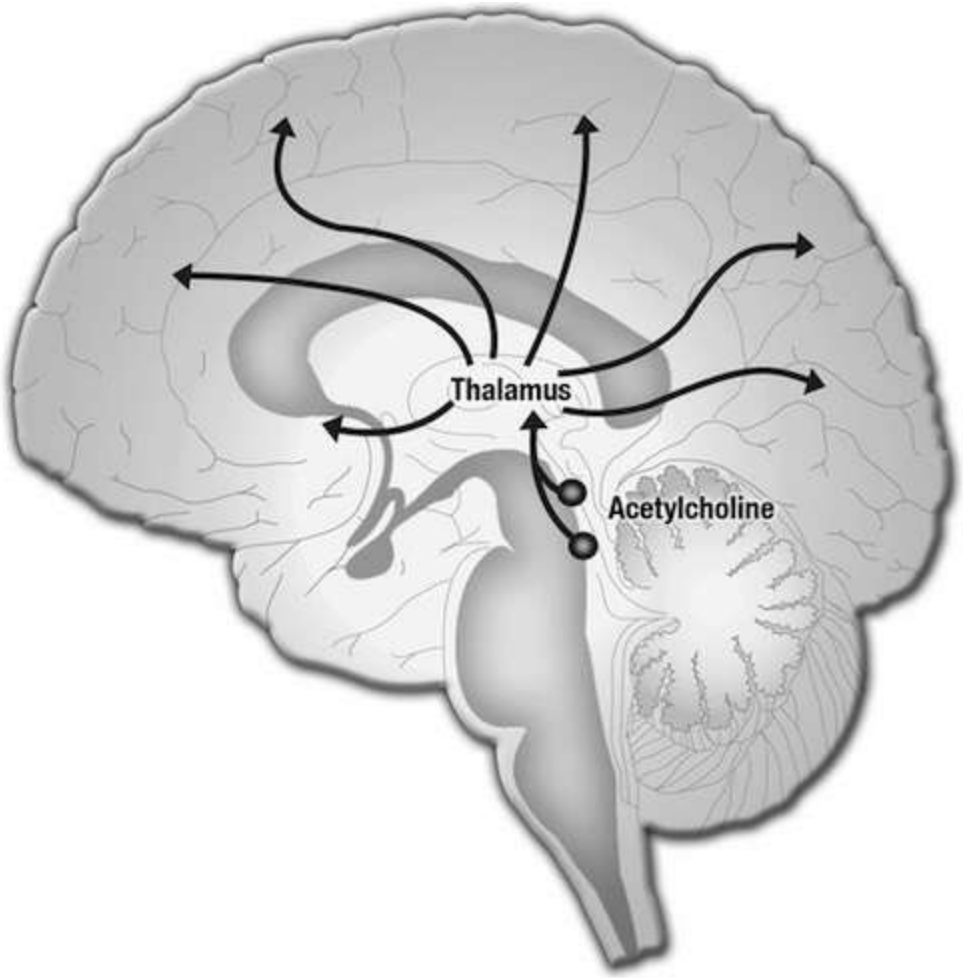


Figure 3. The pontine arousal system for REM consciousness uses the neurotransmitter acetylcholine (Nelson, 2011).

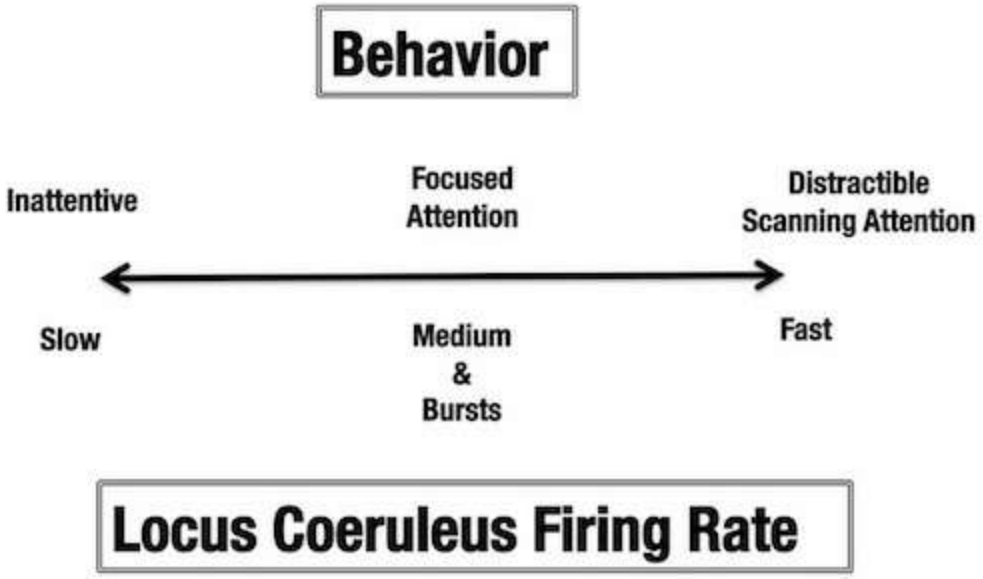


Figure 4. Locus coeruleus firing patterns anticipate primate behavior (derived from AstonJones et al., 2000).

During waking consciousness the activity of the LC is extremely important to maintaining vigilance in response to stress (Rajkowski et al., 1994, Abercrombie and Jacobs, 1987). Feelings of fear, hypoxia, hypotension and hypercarbia, often present during near-death, all vigorously stimulate the LC, increasing its tonic discharge rates (Kaehler et al., 1999, Valentino et al., 1991, Bodineau and Larnicol, 2001).

6. What Becomes of the Activated Locus Coeruleus?

Physiologic mechanisms do not function unchecked in isolation. A classic example is the reciprocal action between the cholinergic and adrenergic portions of the peripheral autonomic nervous system. The LC could be central to an arousal system predisposed to blending REM and waking consciousness. Although factors activating the LC have been extensively investigated, much less is known about how LC activity is tempered. Conditions promoting REM consciousness powerfully inhibit the LC. Only during REM consciousness is the LC relatively silent (Reiner, 1986). Since

LC suppression anticipates both behavior and REM consciousness (Foote et al., 1980), conceivably if scanning attention becomes maladaptive, or focused attention necessary in crisis, then counterbalances like the cholinergic REM system could act on the adrenergic LC.

7. An Inopportune Consciousness

The functioning of the LC provides a clue to how the brain might, counter-intuitively, shift from waking to REM consciousness at a most inopportune moment for survival. Further exploring how the brain could tilt to REM consciousness, when all consciousness is about to cease, requires us to know more about REM consciousness itself.

8. The Consciousness of Light

The visual system comes to the fore during REM consciousness. Light and visual impressions are among the many sensations experienced during REM (McCarley and Hoffman, 1981), and give rise to what can be called REM consciousness. Rapid eye movements (REM) during the dreaming stage of sleep is accompanied by visual system activation. Ponto-geniculo-occipital (PGO) waves, as the name indicates, travel widely from the pons in the brainstem to the (lateral) geniculate nucleus in the thalamus, and then to the visual cortex, thus triggering powerful visual sensations when dreaming. REM consciousness is also characterized by cerebral cortical activation and atonia of nonrespiratory muscles so that individuals do not act on their dreams (Lu et al., 2006, Anaclet et al., 2010). Dreaming, another hallmark of REM consciousness, takes place in cortical areas physically far removed from the brainstem (Bischof and Bassetti, 2004).

It is believed all mammals enter REM consciousness, which testifies to this conscious state's importance. Yet the biologic purpose of dreams remains elusive. The limbic system contributes emotions to our dreams, and sometimes that emotion is fear (Merritt et al., 1994). Limbic structures appeared early in vertebrate evolutionary development, before the primate neocortex formed (Crosby and Schnitzlein, 1982). Dreams have long been considered important to instinctual behavior, and it is argued that one role of our dreams is to simulate and then rehearse solutions to threats (Jouvet, 1973, Valli and Revonsuo, 2009).

9. Into a Second Borderland of Consciousness

Different REM elements can be independently expressed. When consciousness transitions between REM and waking, REM can fragment and leave its traces in waking consciousness. REM intrusions into waking consciousness can take the form of complex visual and auditory hallucinations, as well as the atonia of sleep paralysis or cataplexy. Although a person can get stuck in the borderland between REM and waking, this borderland is unstable--within seconds or minutes consciousness reverts to a more stable REM or waking state. How does someone get caught in this second borderland, the one between REM and waking consciousness? The REM consciousness switch, located near the LC, shifts us between these two states (Lu et al., 2006). The switch is made up of several components. Some of these components tilt consciousness to REM, and others tilt us awake. The switch operates in an all or none flip-flop fashion, and most but not all of the time, it crisply moves the brain between REM and waking.

10. The REM Consciousness Switch in Moments of Crisis

A critical component of the REM switch is the ventrolateral portion of the periaqueductal grey (vlPAG) (Lu et al., 2006). When it activates, consciousness tilts towards waking and away from REM. The vlPAG is fundamental to suppressing REM consciousness (Sapin et al., 2009).

It is fascinating what the vlPAG region does or doesn't do in response to hypotension (with low cerebral blood flow). The vlPAG activates during pain, hypoxia, or moderate blood loss (Keay et al., 2002). This is also when the LC is very active. But something profoundly changes when blood pressure becomes profoundly low. Here vlPAG neurons cause the peripheral adrenergic response to recede, bringing the cholinergic system to dominance (Vagg et al., 2008). The heart, instead of beating rapidly to maintain blood pressure, slows and blood pressure falls even further.

Why would the vlPAG do that?

As the vlPAG retracts the adrenergic nervous system, the once agitated animal with shifting attention becomes quiet and inattentive (Persson and Svensson, 1981), disengaging from its surroundings. Remaining quiet and still when an injury is severe or inescapable may be an effective survival strategy (Bandler et al., 2000). Whatever its advantage, this response to crisis is effective enough to have become imbedded within our evolutionarily

ancient and conserved brainstem. Presumably the LC shifts from high discharge rates to the slow pulse of low arousal.

What brings the LC to this sluggish beat?

Normally when the vlPAG subsides, REM consciousness immediately follows. Is the REM system, the powerful brake on the LC, engaged in crisis?

It is uncertain if the vlPAG neurons responsible for diminishing peripheral adrenergic nervous system activity in the face of hypotension are the same, or even if they are functionally related to the neurons within the REM consciousness switch. That question lies before us. Yet it strains probability to dismiss as simply coincidence the adrenergic withdrawal in two physiological domains coordinated by the same brainstem region.

The known connections between the REM switch and LC emphasizes that successful behaviors like "fight-or-flight", or lying quietly must be coupled to the right conscious state. Although these connections indicate how our visceral responses might bring us into REM consciousness during crisis, what evidence supports this notion?

11. Blending REM and Waking Consciousness is not a Fluke

Blending REM into waking consciousness frequently occurs but is infrequently recognized. The REM atonia of sleep paralysis happens in the lifetime of roughly six percent of people (Ohayon et al., 2002, Aldrich, 1996), often combined with visual or auditory hallucinations (Ohayon et al., 1999, Fukuda et al., 1987, Cheyne et al., 1999, Takeuchi et al., 1992). Cataplexy is less common, occurring in 1.2% to 3.2% (Ohayon et al., 2002, Hublin et al., 1994). REM visual activation during waking consciousness is found in 19 to 28 % of people (Aldrich, 1996, Ohayon et al., 2002, Cheyne et al., 1999).

The borderland between REM and waking consciousness underlies other clinical conditions, and nowhere is this truer than for narcolepsy. Here the cardinal abnormality is an inability to control the boundaries between REM and waking consciousness (Broughton et al., 1986). Patients with narcolepsy have a hypocretin deficiency causing their REM switch, including the vlPAG, to tilt rapidly and frequently between waking and REM consciousness (Lu et al., 2006, Kaur et al., 2009).

It is reasonable to expect that the brains are different in the 6.3% to 12% who survive cardiac dysrhythmia with a near-death experience (Parnia et al.,

2001, Greyson, 2003, van Lommel et al., 2001). In fact, persons with a near-death experience have an arousal system predisposed to entering the borderland of REM and waking consciousness (Nelson et al., 2006). Sixty percent had in their life some form of REM blending into waking consciousness. This is greater than the twenty-four percent of age and gender matched controls. Remarkably, the forty-six percent of those near-death who also had sleep paralysis compares similarly to the fifty percent of narcoleptics with sleep paralysis (Aldrich, 1996).

12. An Origin of Near-Death Experience

The experience of near-death requires a confluence of events. Oftentimes one key factor is the psychological reaction to danger. Survivors of danger can feel detached or psychologically dissociated from the world or their body (Noyes et al., 1977). They may also experience heightened arousal with thoughts speeded up, sharp or lucid. A sense of greater control is common, and all of this likely reflects neural pathways that improve survival by diminishing panic. These pathways may also be utilized during syncope in the absence of danger (Lempert et al., 1994b).

Near-death experiences can rise from danger alone and be nearly indistinguishable from those emerging during physiological crisis like cardiac dysrhythmia (Owens et al., 1990). One of the few discerning features is the appearance of "enhanced light" during genuine physiological threat.

13. The Tunnel and Light

At the beginning of syncope, a tunnel-like peripheral to central visual loss develops over 5 to 8 seconds from retinal ischemia, while brain cortical functions remain (Lambert and Wood, 1946). Ambient light is at the end of the tunnel. The eyes are kept open during syncope (Lempert and von Brevern, 1996), allowing light to strike an ischemic and failing retina. Smudges of outside light at the end of the tunnel may be all the brain is capable of seeing while on the threshold of unconsciousness. Light is the prime sensation in REM consciousness, and the often cited light of near-death could also arise from visual system activation brought on by REM mechanisms. In the absence of retinal input, pontine REM mechanisms are the dominant influence over the visual relay to the cerebral cortex (McCarley et al., 1983).

Cortical ischemia alone would not prevent REM light and visions. The cortically blind are capable of visual dream imagery (Solms, 1997), although during REM the primary visual (striate) cortex is deactivated (Braun et al., 1997), the extrastriate visual cortex is activated (Braun et al., 1998). Moreover, simple and complex visual hallucinations are reported by a majority during the brain ischemia of syncope (Lempert et al., 1994b).

14. Nerves of the Heart Draw Us into the Borderland of Consciousness

Undoubtedly the near-death conditions of danger, imperiled cerebral blood flow and cardio-respiratory crisis heighten cardio-respiratory afferent nerve activity. Autonomic nervous system afferent fibers transmit information from stretch, pressure, mechanical, and chemical receptors located within the heart, vascular and pulmonary systems. These impulses are conveyed to the brainstem principally by the vagus, but also by the glossopharygeal and trigeminal nerves. The cervical portion of the vagus is made up of approximately 80% visceral afferents (Agostoni et al., 1957). Vagal afferents alone robustly bring the brain into REM consciousness.

Electrical stimulation of the vagus in animals triggers the visual, cortical and atonic physiological facets of REM consciousness (Puizillout and Foutz, 1976, ValdesCruz et al., 2002, Fernandez-Guardiola et al., 1999, Puizillout and Foutz, 1977, Foutz et al., 1974). The transition from waking to REM can be so brisk that it spawned the terms “reflex REM narcolepsy” (Puizillout and Foutz, 1977) and “narcoleptic reflex” (Valdes-Cruz et al., 2002). This rapid transition between conscious states is the very condition that in humans causes REM and waking consciousness to merge (Takeuchi et al., 1992).

When the vagus nerve is stimulated in humans to treat epilepsy, REM intrudes into non-REM consciousness (Malow et al., 2001). Furthermore, the cardio-respiratory instability arising from an autoimmune attack on cardiac, vascular and respiratory autonomic nerve fibers in patients with Guillain-Barré syndrome leads to florid intrusion of REM consciousness (Cochen et al., 2005).

How can the vagus nerve shift consciousness?

Vagal afferents project upwards to synapse within the medullary nucleus tractus solitarius. From here, neural fibers rise to the pontine parabrachial nuclear complex (PBN) that is the principal relay for ascending cardio-respiratory afferents to the forebrain. In addition, the nucleus tractus solitarius

and the PBN reciprocally connect with cholinergic REM structures (Semba and Fibiger, 1992, Quattrochi et al., 1998). The PBN region forms an intersection where neurons promoting and functioning specifically during REM consciousness (Datta et al., 1992, Datta and Hobson, 1994) intermingle with neurons participating in cardio-respiratory function (Chamberlin and Saper, 1992, Chamberlin and Saper, 1994).

Although these relationships lead to a connection between fight-or-flight, consciousness, and cardio-respiratory crisis, the full story of vagal afferents and REM consciousness remains to be seen. What is clear is that through its nerves the heart can cause REM consciousness, thereby transporting consciousness to unexpected places.

15. Out-of Body Experience and REM Consciousness

Out-of body experience (autoscopy) is an astonishingly common and normal experience. In a survey of over 13,000 people, 5.8% reported at least one autoscopic experience (Ohayon, 2000). Autoscopy is a common feature of near-death, that occurs with danger alone (Noyes and Kletti, 1976), and surprisingly does not distinguish between those who are or are not medically near death (Owens et al., 1990). This is consistent with the observation that syncope in the safe laboratory provokes autoscopy about 10% of the time (Lempert et al., 1994b).

Autoscopy has a long and established relationship with REM consciousness. Narcoleptics are prone to autoscopy (Mahowald and Schenck, 1992, Overeem et al., 2001), and its frequency wanes as the narcolepsy is treated. Autoscopy may appear in lucid dreams, a special expression of dreaming when the dreamer possesses the insight they are dreaming (LaBerge et al., 1988). In young healthy adults autoscopy accompanies the sleep paralysis of REM consciousness (Cheyne and Girard, 2009).

Autoscopy is directly produced by stimulating the temporoparietal region (Blanke et al., 2002), probably by disturbing sensory integration into the coherent self. Other temporoparietal disruptions cause autoscopy as well (Blanke et al., 2004). The temporoparietal region is also selectively inactive during REM consciousness, directly suggesting how REM consciousness and autoscopy are related (Maquet et al., 2005) (figure 5).

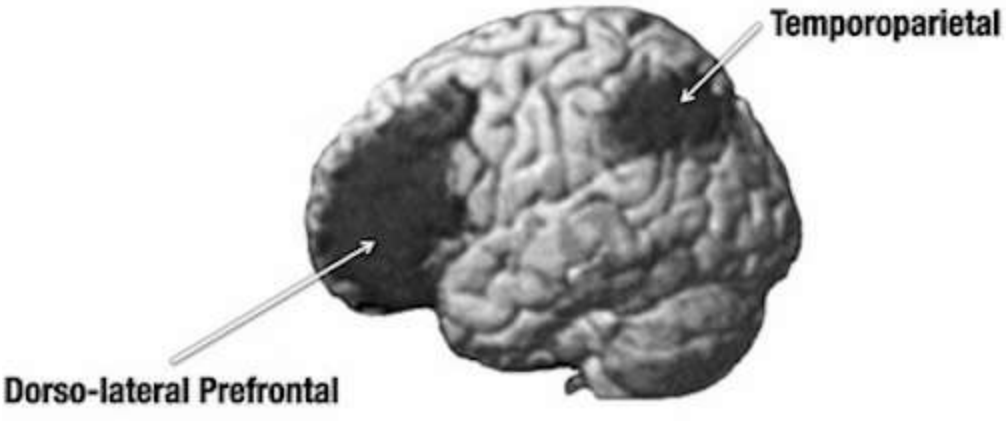


Figure 5. A combined 207 PET scans during REM consciousness show selective metabolic inactivity of the dorso-lateral prefrontal and temporoparietal regions. Adopted from Maquet et al., (2005) with permission

Autoscopy is particularly forceful during REM consciousness. Persons with a near-death experience are as likely to have autoscopy transitioning between REM and waking consciousness as they are to have autoscopy during near-death itself (Nelson et al., 2007). Often their autoscopy occurs during sleep paralysis.

16. Heaven-like Rewards

The brain's reward system could underlie the feelings of rapture, peace or euphoria often present during near-death. The REM consciousness promoting PPT and LDT nuclei are also instrumental to promoting reward behavior (Yeomans et al., 1993). Pathways from these REM structures project to an integral part of the reward system, the brainstem ventral tegmental region (Oakman et al., 1995). During REM consciousness ventral tegmental neurons vigorously discharge (Dahan et al., 2007). In animals, PPT injury reduces the reward seeking behavior for many strong stimuli including food (Alderson et al., 2002) and self administered heroin (Olmstead et al., 1998). In humans, the limbic and paralimbic regions active in REM sleep are also important in the reward system (Nofzinger et al., 1997). Pleasant or positive feelings are common during syncope (Lempert et al., 1994b), suggesting these reward pathways have been activated.

17. Divine-like Dreams

REM consciousness during peril provides a mechanism for activating limbic and paralimbic structures believed to underpin the narrative, ineffable, transcendental and paranormal qualities of near-death. In REM sleep, amygdala and anterior cingulate gyrus activity is detected on PET scan (Nofzinger et al., 1997, Braun et al., 1997, Maquet et al., 1996), and PGO waves propagate to the basolateral amygdala, cingulate gyrus, and hippocampus (Calvo and Fernandez-Guardiola, 1984). REM consciousness could also underlie the "dreaming" during syncope that pilots report (Lambert and Wood, 1946, Forster and Whinnery, 1988).

Many ancient and modern cultures regard dreams an augur of the future, and connection to the divine and deceased. There are many shared narrative qualities of dreaming and near-death, and a fuller comparison is found elsewhere (Nelson, 2011). One such example is sensing "someone's" presence. This happens in 9% of people as REM intrudes into waking consciousness (Ohayon, 2000), and bears similarity to the presences sensed during near-death. These presences, like autoscopy, can arise directly by stimulating the temporoparietal cortex (Arzy et al., 2006).

Obviously dreams and near-death differ. Near-death is recalled with an intense sense of realness that sharply contrasts to dreams. Near-death narratives lack the bizarreness of dreams. Yet near-death can be almost identical to lucid dreams (LaBerge and Rheingold, 1990), when the dorso-lateral prefrontal region, instrumental to logical executive cognition, may remain active during REM consciousness(Hobson, 2009).

Why some experiences seem real and others do not is a compelling ambiguity. But one thing is certain; our sense of reality profoundly shifts in unexpected ways in REM consciousness. Our dreams seem so real at the time regardless of how strange we find them on awaking. Inactivating the dorso-lateral prefrontal brain during REM consciousness might contribute to suspending waking reality. How does this brain region function as REM blends with waking consciousness in crisis?

REM consciousness blurs the borders of reality. We must expect an unfamiliar and baffling reality when REM and waking consciousness merge to form a borderland of consciousness.

18. Epilogue

The notion that REM consciousness physiologically contributes to the experience of near-death falls within the realm of reasonable neurological probability. To understand the brain during near-death experience we needn't resort to extraordinary supernatural explanations when ordinary natural explanations suffice. Nonetheless, even if we know how the brain works during spiritual experience, the mystery of why lives on.

References

Abercrombie, E. D. & Jacobs, B. L. (1987). Single-unit response of noradrenergic neurons in the locus coeruleus of freely moving cats. II. Adaptation to chronically presented stressful stimuli. J.Neurosci., 7, 2844-2848.

Agostoni, E., Chinnock, J. E., Daly, M. D. B. & Murray, J. G. (1957). Functional and histological studies of the vagus nerve and its branches to the heart, lungs and abdominal viscera in the cat. J.Physiol, 135, 182-205.

Alderson, H. L., Brown, V. J., Latimer, M. P., Brasted, P. J., Robertson, A. H. & Winn, P. (2002). The effect of excitotoxic lesions of the pedunculopontine tegmental nucleus on performance of a progressive ratio schedule of reinforcement. Neuroscience, 112, 417425.

Aldrich, M. S. (1996). The clinical spectrum of narcolepsy and idiopathic hypersomnia. Neurology, 46, 393-401.

Anaclet, C., Pedersen, N. P., Fuller, P. M. & Lu, J. (2010). Brainstem circuitry regulating phasic activation of trigeminal motoneurons during REM sleep. PLoS One, 5, e8788.

Arzy, S., Seeck, M., Ortigue, S., Spinelli, L. & Blanke, O. (2006). Induction of an illusory shadow person. Nature, 443, 287.

Aston-Jones, G., Rajkowski, J. & Cohen, J. (2000). Locus coeruleus and regulation of behavioral flexibility and attention. Prog Brain Res, 126, 165-82.

Author. (1988). What I saw when I was dead... The Sunday Telegraph, August 28, p.5.

Bandler, R., Keay, K. A., Floyd, N. & Price, J. (2000). Central circuits mediating patterned autonomic activity during active vs. passive emotional coping. Brain Res Bull, 53, 95104.

Benarroch, E. E. (2008). The arterial baroreflex: functional organization and involvement in neurologic disease. Neurology, 71, 1733-8.

Benarroch, E. E. (2009). The locus ceruleus norepinephrine system: functional organization and potential clinical significance. Neurology, 73, 1699-704.

Bischof, M. & Bassetti, C. L. (2004). Total dream loss: A distinct neuropsychological dysfunction after bilateral PCA stroke. Ann Neurol, 56, 583-586.

Blanke, O., Landis, T., Spinelli, L. & Seeck, M. (2004). Out-of-body experience and autoscopy of neurological origin. Brain, 127, 243-58.

Blanke, O., Ortigue, S., Landis, T. & Seeck, M. (2002). Neuropsychology: Stimulating illusory own-body perceptions. Nature, 419, 269-270.

Bodineau, L. & Larnicol, N. (2001). Brainstem and hypothalamic areas activated by tissue hypoxia: Fos-like immunoreactivity induced by carbon monoxide inhalation in the rat. Neuroscience, 108, 643-653.

Braun, A. R., Balkin, T. J., Wesensten, N. J., Gwadry, F., Carson, R. E., Varga, M., Baldwin, P., Belenky, G. & Herscovitch, P. (1998). Dissociated pattern of activity in visual cortices and their projections during human rapid eye movement sleep. Science, 279, 91-5.

Braun, A. R., Balkin, T. J., Wesenten, N. J., Carson, R. E., Varga, M., Baldwin, P., Selbie, S., Belenky, G. & Herscovitch, P. (1997). Regional cerebral blood flow throughout the sleep-wake cycle. An H2(15)O PET study. Brain, 120, 1173-1197.

Brenner, R. P. (1997). Electroencephalography in syncope. J.Clin Neurophysiol., 14, 197-209.

Broughton, R., Valley, V., Aguirre, M., Roberts, J., Suwalski, W. & Dunham, W. (1986). Excessive daytime sleepiness and the pathophysiology of narcolepsy-cataplexy: a laboratory perspective. Sleep, 9, 205-215.

Calvo, J. M. & Fernandez-Guardiola, A. (1984). Phasic activity of the basolateral amygdala, cingulate gyrus, and hippocampus during REM sleep in the cat. Sleep, 7, 202-210.

Cannon, W. B. 1923-2003. Bradford Cannon Papers, 1911. Boston, MA: Harvard Medical Library, Francis A. Countway Library of Medicine.

Chamberlin, N. L. & Saper, C. B. (1992). Topographic organization of cardiovascular responses to electrical and glutamate microstimulation of the parabrachial nucleus in the rat. J.Comp Neurol., 326, 245-262.

Chamberlin, N. L. & Saper, C. B. (1994). Topographic organization of respiratory responses to glutamate microstimulation of the parabrachial nucleus in the rat. J.Neurosci., 14, 65006510.

Cheyne, J. A. & Girard, T. A. (2009). The body unbound: vestibular-motor hallucinations and out-of-body experiences. Cortex, 45, 201-15.

Cheyne, J. A., Rueffer, S. D. & Newby-Clark, I. R. (1999). Hypnagogic and hypnopompic hallucinations during sleep paralysis: neurological and cultural construction of the nightmare. Conscious.Cogn, 8, 319-337.

Cochen, V., Arnulf, I., Demeret, S., Neulat, M. L., Gourlet, V., Drouot, X., Moutereau, S., Derenne, J. P., Similowski, T., Willer, J. C., Pierrot-Deseiligny, C. & Bolgert, F. (2005). Vivid dreams, hallucinations, psychosis and REM sleep in Guillain-Barre syndrome. Brain, 128, 2535-45.

Crosby, E. C. & Schnitzlein, H. N. (1982). Comparative correlative neuroanatomy of the vertebrate telencephalon, New York, Macmillan.

Dahan, L., Astier, B., Vautrelle, N., Urbain, N., Kocsis, B. & Chouvet, G. (2007). Prominent burst firing of dopaminergic neurons in the ventral tegmental area during paradoxical sleep. Neuropsychopharmacology, 32, 1232-41.

Datta, S., Calvo, J. M., Quattrochi, J. & Hobson, J. A. (1992). Cholinergic microstimulation of the peribrachial nucleus in the cat. I. Immediate and prolonged increases in pontogeniculooccipital waves. Arch.Ital.Biol., 130, 263-284.

Datta, S. & Hobson, J. A. (1994). Neuronal activity in the caudolateral peribrachial pons: relationship to PGO waves and rapid eye movements. J.Neurophysiol., 71, 95-109.

Deegan, B. M., Devine, E. R., Geraghty, M. C., Jones, E., Olaighin, G. & Serrador, J. M. (2010). The relationship between cardiac output and dynamic cerebral autoregulation in humans. J Appl Physiol, 109, 1424-31.

Fernandez-Guardiola, A., Martinez, A., Valdes-Cruz, A., Magdaleno-Madrigal, V. M., Martinez, D. & Fernandez-Mas, R. (1999). Vagus nerve prolonged stimulation in cats: effects on epileptogenesis (amygdala electrical kindling): behavioral and electrographic changes. Epilepsia, 40, 822-829.

Foote, S. L., Aston-Jones, G. & Bloom, F. E. (1980). Impulse activity of locus coeruleus neurons in awake rats and monkeys is a function of sensory stimulation and arousal. Proc Natl Acad Sci U S A, 77, 3033-7.

Forster, E. M. & Whinnery, J. E. (1988). Recovery from Gz-induced loss

of consciousness: psychophysiologic considerations. Aviat.Space Environ.Med., 59, 517-522.

Foutz, A. S., Ternaux, J. P. & Puizillout, J. J. (1974). Les stades de sommeil de la preparation “encephale isole”: II. Phases paradoxales. leur declenchement par la stimulation des afferences baroceptives. Electroencephalogr.Clin.Neurophysiol., 37, 577-588.

Fukuda, K., Miyasita, A., Inugami, M. & Ishihara, K. (1987). High prevalence of isolated sleep paralysis: kanashibari phenomenon in Japan. Sleep, 10, 279-286.

Greyson, B. (2003). Incidence and correlates of near-death experiences in a cardiac care unit. Gen Hosp Psychiatry, 25, 269-76.

Hobson, J. A. (2009). REM sleep and dreaming: towards a theory of protoconsciousness. Nat Rev Neurosci, 10, 803-13.

Hobson, J. A., Mccarley, R. W. & Wyzinski, P. W. (1975). Sleep cycle oscillation: reciprocal discharge by two brainstem neuronal groups. Science, 189, 55-58.

Hublin, C., Kaprio, J., Partinen, M., Koskenvuo, M., Heikkila, K., Koskimies, S. & Guilleminault, C. (1994). The prevalence of narcolepsy: an epidemiological study of the Finnish Twin Cohort. Ann.Neurol, 35, 709-716.

James, W. & Marty, M. E. 1982. The varieties of religious experience : a study in human nature, Harmondsworth, Middlesex, England ; New York, N.Y., Penguin Books.

Jones, T. H., Morawetz, R. B., Crowell, R. M., Marcoux, F. W., Fitzgibbon, S. J., Degirolami, U. & Ojemann, R. G. (1981). Thresholds of focal cerebral ischemia in awake monkeys. J Neurosurg, 54, 773-82.

Jouvet, M. (1973). [Sleep study]. Arch Ital Biol, 111, 564-76.

Jung, C. G. & Jaffé, A. 1989. Memories, dreams, reflections, New York, Vintage Books. Kaehler, S. T., Singewald, N. & Philippu, A. (1999). The release of catecholamines in hypothalamus and locus coeruleus is modulated by peripheral chemoreceptors. Naunyn Schmiedebergs Arch.Pharmacol., 360, 428-434.

Kandel, E. R. (1998). A new intellectual framework for psychiatry. Am.J.Psychiatry, 155, 457469.

Kaur, S., Thankachan, S., Begum, S., Liu, M., Blanco-Centurion, C. & Shiromani, P. J. (2009). Hypocretin-2 saporin lesions of the ventrolateral periaquaductal gray (vlPAG) increase REM sleep in hypocretin knockout

mice. PLoS One, 4, e6346.

Keay, K. A., Clement, C. I., Matar, W. M., Heslop, D. J., Henderson, L. A. & Bandler, R. (2002). Noxious activation of spinal or vagal afferents evokes distinct patterns of fos-like immunoreactivity in the ventrolateral periaqueductal gray of unanaesthetised rats. Brain Res, 948, 122-30.

Laberge, S., Levitan, L., Brylowski, A. & Dement, W. (1988). "Out-of-body" experiences occurring in REM sleep. Sleep Res, 17, 115.

Laberge, S. & Rheingold, H. 1990. Exploring the World of Lucid Dreaming, New York, NY, Ballantine.

Lambert, E. H. & Wood, E. H. (1946). The problem of blackout and unconsciousness in aviators. Med.Clinic.North Am., 30, 833-844.

Lempert, T., Bauer, M. & Schmidt, D. (1994a). Syncope and near-death experience. Lancet, 344, 829-830.

Lempert, T., Bauer, M. & Schmidt, D. (1994b). Syncope: a videometric analysis of 56 episodes of transient cerebral hypoxia. Ann.Neurol., 36, 233-237.

Lempert, T. & Von Brevern, M. (1996). The eye movements of syncope. Neurology, 46, 10861088.

Lu, J., Sherman, D., Devor, M. & Saper, C. B. (2006). A putative flip-flop switch for control of REM sleep. Nature, 441, 589-94.

Mahowald, M. W. & Schenck, C. H. (1992). Dissociated states of wakefulness and sleep. Neurology, 42, 44-51.

Malow, B. A., Edwards, J., Marzec, M., Sagher, O., Ross, D. & Fromes, G. (2001). Vagus nerve stimulation reduces daytime sleepiness in epilepsy patients. Neurology, 57, 879-884.

Maquet, P., Peters, J., Aerts, J., Delfiore, G., Degueldre, C., Luxen, A. & Franck, G. (1996). Functional neuroanatomy of human rapid-eye-movement sleep and dreaming. Nature, 383, 163-166.

Maquet, P., Ruby, P., Maudoux, A., Albouy, G., Sterpenich, V., Dang-Vu, T., Desseilles, M., Boly, M., Perrin, F., Peigneux, P. & Laureys, S. (2005). Human cognition during REM sleep and the activity profile within frontal and parietal cortices: a reappraisal of functional neuroimaging data. Prog Brain Res, 150, 219-27.

Mccarley, R. W., Benoit, O. & Barrionuevo, G. (1983). Lateral geniculate nucleus unitary discharge in sleep and waking: state and rate-specific aspects. J.Neurophysiol., 50, 798818.

Mccarley, R. W. & Hoffman, E. (1981). REM sleep dreams and the activation-synthesis hypothesis. Am J Psychiatry, 138, 904-12.

Merritt, J. M., Stickgold, R., Pace-Schott, E., Williams, E. F. & Hobson, J. A. (1994). Emotion Profiles in the Dreams of Young Adult Men and Women. Conscious Cogn, 3, 46-60.

Moody, R. 1987. Elvis After Life, Atlanta, GA, Peachtree Publishers, Ltd.

Morse, M., Castillo, P., Venecia, D., Milstein, J. & Tyler, D. C. (1986). Childhood near-death experiences. Am.J.Dis.Child, 140, 1110-1114.

Nelson, K. R. 2011. The Spiritual Doorway in the Brain: A Neurologist's Search for the God Experience, New York, NY, Penguin Group.

Nelson, K. R., Mattingly, M., Lee, S. A. & Schmitt, F. A. (2006). Does the arousal system contribute to near death experience? Neurology, 66, 1003-9.

Nelson, K. R., Mattingly, M. & Schmitt, F. A. (2007). Out-of-body experience and arousal. Neurology, 68, 794-5.

Nofzinger, E. A., Mintun, M. A., Wiseman, M., Kupfer, D. J. & Moore, R. Y. (1997). Forebrain activation in REM sleep: an FDG PET study. Brain Res., 770, 192-201.

Noyes, R., Jr., Hoenk, P. R., Kuperman, S. & Slymen, D. J. (1977). Depersonalization in accident victims and psychiatric patients. J Nerv Ment Dis, 164, 401-7.

Noyes, R., Jr. & Kletti, R. (1976). Depersonalization in the face of life-threatening danger: a description. Psychiatry, 39, 19-27.

Oakman, S. A., Faris, P. L., Kerr, P. E., Cozzari, C. & Hartman, B. K. (1995). Distribution of pontomesencephalic cholinergic neurons projecting to substantia nigra differs significantly from those projecting to ventral tegmental area. J.Neurosci., 15, 5859-5869.

Ohayon, M. M. (2000). Prevalence of hallucinations and their pathological associations in the general population. Psychiatry Res., 97, 153-164.

Ohayon, M. M., Priest, R. G., Zulley, J., Smirne, S. & Paiva, T. (2002). Prevalence of narcolepsy symptomatology and diagnosis in the European general population. Neurology, 58, 18261833.

Ohayon, M. M., Zulley, J., Guilleminault, C. & Smirne, S. (1999). Prevalence and pathologic associations of sleep paralysis in the general population. Neurology, 52, 1194-1200.

Olmstead, M. C., Munn, E. M., Franklin, K. B. & Wise, R. A. (1998). Effects of pedunculopontine tegmental nucleus lesions on responding for intravenous heroin under different schedules of reinforcement. J.Neurosci., 18, 5035-5044.

Overeem, S., Mignot, E., Van Dijk, J. G. & Lammers, G. J. (2001). Narcolepsy: clinical features, new pathophysiologic insights, and future perspectives. J Clin Neurophysiol, 18, 78-105.

Owens, J. E., Cook, E. W. & Stevenson, I. (1990). Features of "near-death experience" in relation to whether or not patients were near death. Lancet, 336, 1175-1177.

Parnia, S., Waller, D. G., Yeates, R. & Fenwick, P. (2001). A qualitative and quantitative study of the incidence, features and aetiology of near death experiences in cardiac arrest survivors. Resuscitation, 48, 149-156.

Pasricha, S. & Stevenson, I. (1986). Near-death experiences in India. A preliminary report. J.Nerv.Ment.Dis., 174, 165-170.

Persson, B. & Svensson, T. H. (1981). Control of behaviour and brain noradrenaline neurons by peripheral blood volume receptors. J Neural Transm, 52, 73-82.

Puizillout, J. J. & Foutz, A. S. (1976). Vago-aortic nerves stimulation and REM sleep: evidence for a REM-triggering and a REM-maintenance factor. Brain Res., 111, 181-184.

Puizillout, J. J. & Foutz, A. S. (1977). Characteristics of the experimental reflex sleep induced by vago-aortic nerve stimulation. Electroencephalogr.Clin.Neurophysiol., 42, 552-563.

Quattrochi, J., Datta, S. & Hobson, J. A. (1998). Cholinergic and non-cholinergic afferents of the caudolateral parabrachial nucleus: a role in the long-term enhancement of rapid eye movement sleep. Neuroscience, 83, 1123-1136.

Rajkowski, J., Kubiak, P. & Aston-Jones, G. (1994). Locus coeruleus activity in monkey: phasic and tonic changes are associated with altered vigilance. Brain Res.Bull., 35, 607-616.

Reiner, P. B. (1986). Correlational analysis of central noradrenergic neuronal activity and sympathetic tone in behaving cats. Brain Res., 378, 86-96.

Sapin, E., Lapray, D., Berod, A., Goutagny, R., Leger, L., Ravassard, P., Clement, O., Hanriot, L., Fort, P. & Luppi, P. H. (2009). Localization of the

brainstem GABAergic neurons controlling paradoxical (REM) sleep. PLoS One, 4, e4272.

Semba, K. & Fibiger, H. C. (1992). Afferent connections of the laterodorsal and the pedunculopontine tegmental nuclei in the rat: a retroand antero-grade transport and immunohistochemical study. J.Comp Neurol., 323, 387-410.

Solms, M. 1997. The neuropsychology of dreams: A clinico-anatomical study., Mahwah, NJ, Erlbaum.

Takeuchi, T., Miyasita, A., Sasaki, Y., Inugami, M. & Fukuda, K. (1992). Isolated sleep paralysis elicited by sleep interruption. Sleep, 15, 217-225.

Vagg, D. J., Bandler, R. & Keay, K. A. (2008). Hypovolemic shock: critical involvement of a projection from the ventrolateral periaqueductal gray to the caudal midline medulla. Neuroscience, 152, 1099-109.

Valdes-Cruz, A., Magdaleno-Madrigal, V. M., Martinez-Vargas, D., Fernandez-Mas, R., Almazan-Alvarado, S., Martinez, A. & Fernandez-Guardiola, A. (2002). Chronic stimulation of the cat vagus nerve: effect on sleep and behavior. Prog.Neuropsychopharmacol.Biol.Psychiatry, 26, 113-118.

Valentino, R. J., Page, M. E. & Curtis, A. L. (1991). Activation of noradrenergic locus coeruleus neurons by hemodynamic stress is due to local release of corticotropin-releasing factor. Brain Res., 555, 25-34.

Valli, K. & Revonsuo, A. (2009). The threat simulation theory in light of recent empirical evidence: a review. Am J Psychol, 122, 17-38.

Van Lommel, P., Van Wees, R., Meyers, V. & Elfferich, I. (2001). Near-death experience in survivors of cardiac arrest: a prospective study in the Netherlands. Lancet, 358, 20392045.

Yeomans, J. S., Mathur, A. & Tampakeras, M. (1993). Rewarding brain stimulation: role of tegmental cholinergic neurons that activate dopamine neurons. Behav.Neurosci., 107, 1077-1087.

8. Consciousness, Dissociation and Self-Consciousness

Ellert R.S. Nijenhuis, Ph.D. Top Referent Trauma Center, Mental Health Care Drenthe, Assen, The Netherlands

Abstract

The philosophy and psychology of dissociative disorders and the

fragmenting of consciousness and personality are discussed in reference to self-consciousness.

KEY WORDS: Consciousness, dissociation, self-consciousness

1. Introduction

Our conscious personality constitutes a well integrated, dynamic biopsychosocial system that is associated with characteristic mental and behavioral actions but which remains open to change through experience and maturation which may be integrated into the core personality (Edelman & Tononi, 2000; Fuster, 2003; Janet, 1889, 1935; Van der Hart, Nijenhuis, & Steele, 2006) . However, the same is not true of the personality and consciousness of patients with dissociative disorders, a condition associated with emotional trauma so profound the conscious personality shatters (American Psychiatric Association, 1994). In dissociative disorders, the conscious personality is fragmented, and is insufficiently integrated and consists of overly rigid biopsychosocial subsystems or dissociative parts (Nijenhuis, 2011; Nijenhuis & Van der Hart, 2011); it is as if several different conscious personalities exist in the same head, but with each separate from the other. A crucial feature is that each dissociated fragment of the conscious personality has their own sense of self, world, and self-in-the-world (Nijenhuis, 2011). Each dissociated consciousness also believes their dissociative ways of experiencing and knowing themselves and the world reflect 'objective' reality. The different, often conflicting feelings, perceptions, and ideas of dissociative parts cause struggles among them, as well as fears of each other (Van der Hart et al., 2006).

More specifically, dissociative fragmentation of the conscious mind can be manifested in the expression of multiple distinct identities or personalities, each with its own unique pattern of thinking, feeling, and behaving, and with their own memories. This is not some epiphenomenon. It has been demonstrated that EEGs (Hughes et al., 1990; Lapointe et al., 2006), and cerebral blood flow (Matthew et al., 1985; Reinders et al., 2003, 2006) significantly differ when different aspects of the fragmented conscious mind come to the fore, and that the parietal lobe differs from normals (Garcia-Campay et al., 2009); a region of the brain associated with the body image (Joseph 2009).

Dissociative patients characteristically display shifts in dominance of

consciousness and behavior among their parts, as well as intrusions of one part into the conscious domain of one or more other parts (Nijenhuis, 2004; Dell, 2006; Kluft, 1987; Ross et al., 1990; Van der Hart et al., 2006).

Dissociation of the personality manifests in dissociative symptoms, that can be categorized as psychoform and somatoform, and as negative and positive (Nijenhuis, 2004; Van der Hart et al., 2006; see Table 1). For example, dissociative parts of the conscious mind can have negative symptoms such as analgesia (i.e., insensitivity for pain), anesthesia (e.g., visual, kinesthetic, auditory), lack propriocepsis, as well as sense of ownership and agency with respect to particular body parts, inability to move, or to remember recent or remote episodes. They may also have positive dissociative symptoms such as pain, hearing voices of other dissociative parts; that is, one part of the dissociated mind may receive information from another region of the mind, in a manner similar to split-brain patients (Joseph 1988a,b; 2009). Negative and positive dissociative symptoms are generally linked. Thus, one part of the dissociated mind may be analgesic, but an other part may suffer pain in particular parts of their body. Dissociative parts may hear each the voices of the other fragments of consciousness, or intrude upon each other in different ways. They may reenact traumatic memories, or be intruded by a different part's traumatic memories (Van der Kolk & Van der Hart, 1989); that is, one dissociated conscious personality will remember events it did not experience, but which were experienced and committed to the memory of a different dissociated consciousness which had split off from the rest of the mind. These memories are not narratives like normal autobiographical memories, but sensorimotor and highly emotionally charged experiences (Van der Hart et al., 2006). Although they may not realize it, they are reenacting the past, and what is being being remembered, is not a memory, but is happening here and now.

Table 1. Dissociative symptoms: A 2 x 2 classification

	Psychoform	Somatoform
Negative	Amnesia Depersonalization Emotional anesthesia	Bodily anesthesia (visual, auditory, et cetera) Analgesia Motor inhibitions
Positive	Intrusions (not personified experiences and perceptions), such as hearing voices, undergoing emotions, thoughts, images, and (traumatic) memories of other dissociative parts	Intrusions (not personified bodily feelings and body movements), such as feeling physically touched by someone else, having pain, bodily movements, bodily components of traumatic memories, that all stem from other dissociative parts

These and related differences among different dissociative parts suggest that their sense of self, world, and self-in-the-world are mental contents generated by particular epistemic actions, that is, constructions developed in interaction with a material and social environment (Metzinger, 2003; Nijenhuis, 2011). This action perspective on (self-)consciousness is also grounded in the observation that 'fusion' of formerly dissociated parts is associated with instant loss of the former and rapid generation of a more or less different sense of self--including the body--world, and self-in-the-world.

Like normal individuals, dissociative parts experience and believe their dissociated self to an independent entity or substance that could live by itself, and that it consists of an invariant set of intrinsic properties, as well as a unique and indivisible unity (cf. Metzinger, 2003). The phenomena of dissociative disorders clearly challenge the reality of this view even when applied to the normal conscious personality. The way in which dissociative parts experience and know themselves and the world involve the epistemic contents of their ongoing constructive actions, the same can be said of anyone's self and world--as the Buddha contended, and as some Western philosophers contend (e.g., Kant, 1998; Schopenhauer, 1958; Metzinger, 2003).

In this light, dissociative disorders may provide a window of opportunity to examine what mental actions and biopsychosocial underpinnings are involved in what has been described as "self-consciousness"; what individuals must do to be consciously aware of themselves and their environment.

2. Parts and Wholes

Does it make sense to study parts of a whole? This question obviously applies to dissociative disorders. However, it is not any less relevant to the study of (self-)consciousness in health. This topic is therefore addressed first at some length.

As human beings, we, as a whole organism, are conscious of a world and of ourselves, and we have goals and engage in actions. Although it is true that the brain is related to consciousness and different regions of the brain subserve different functions (Joseph 1988a,b; 2009), ascribing psychological predicates to functional parts of a whole system confuses relationships between wholes and parts and could be considered a mereological fallacy (Bennett & Hacker, 2003). It is "[o]nly of a human being and what resembles (behaves like) a living human being can one say: it has sensations; it sees; hears; is deaf; is conscious or unconscious" (Wittgenstein, 1953, entry 281).

Body and Mind The 17th Century witnessed the start of a major mereological discussion on the mind-body relationship. As Spinoza (1996) emphasized, Descartes (1960) erred to distinguish between a body and a mind. Ascribing thoughts, feelings, beliefs, fantasies, and other psychological predicates to the mind rather than to a living human being or his personality as an embodied functional entity, is a fallacy. Lacking such faculties, mind is rather a term that denotes a range of human powers, the exercise of these powers, and a range of characteristic human character traits. Whereas most contemporary neuroscientists repudiate Descartes' body-mind dualism, many also assign psychological attributes to parts of a whole—i.e., the brain or parts of the brain--that are characteristic features of functions of the individual as a whole biopsychosocial system (Joseph 1988a,b; 2009). This could be construed as a mereologic error (Bennett & Hacker, 2003).

Brain/body and Environment Another mereological error is to regard the brain in separation of the environment in which it exists. The brain/body as the necessary apparatus for mental contents is dependent on the environment with respect to these contents, otherwise, the brain might remain 'empty' (Northoff, 2003). And an environment can only exist for a living brain/body because, according to some philosophers, there is no observer-independent environment (Kant, 1998; Schopenhauer, 1958). Environment and brain are bilaterally dependent, they are necessary conditions for each other (Northoff, 2003; Thompson, 2007). According to various theories of quantum physics (Bohr 1958; Heisenberg, 1958; Neuman & Tamir, 2009; Stapp 2009), they

also determine each other, they interact, which also applies to the relationship between the body and the environment.

Individuals as whole organisms must adapt to and can creatively change their environment by selecting particular actions to achieve their goals. In this context, individuals at the brain level select particular dynamic patterns, and at the brain/body level engage in particular patterns of motor actions, that match and mold the environment. Conversely, the environment in which an individual lives influences the dynamic brain states and motor actions that will be selected. There is embedment, that is, intrinsic relationships between brain, body, and environment in ontological regard (Northoff, 2003; see Figure 1). Brain, body, and environment are intrinsically coupled (van Gelder, 1995; Gallagher, 2005), and this coupling is dynamic, selective, adaptive, and creative.

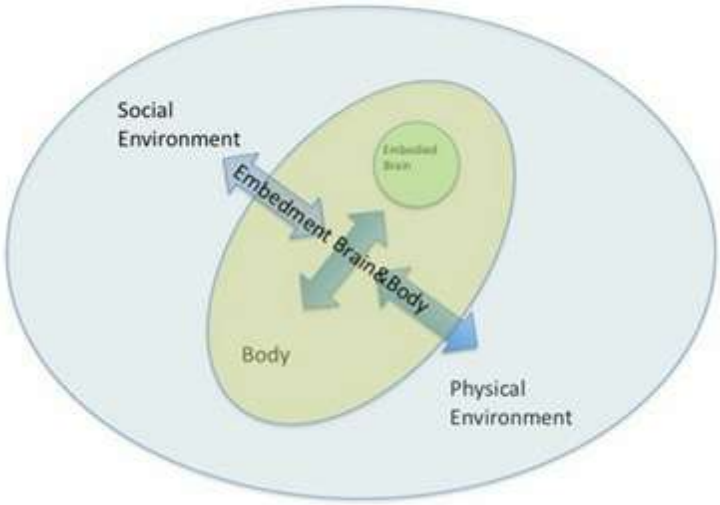


Figure 1. The ontological trinity: Intrinsic relationships between brain, body, environment

For example, the smell of food activates in us the motivational or action system (Lang, Bradley, & Cuthbert, 1998; Panksepp, 1998) of energy management when our organism has a shortage of calories; a function of the hypothalamus and brainstem and other neurological structures which continually sample the internal and external environment. Threat to our physical integrity awakens the action system of defense (Fanselow & Lester, 1988) mediated by, for example, the limbic system which is responsible for emotional and motivational functioning (Joseph 1992). Depending on an

assessment of the actual environmental conditions, we will startle, freeze, flee, fight, or play dead.

What odors will foster eating, and what conditions present 'threat' is also dependent on phylogenetic and ontogenetic features of the subject as a whole organism. Thus, the intrinsic relationship between the embrained and embodied individual as a whole biopsychosocial system and the environment is also characterized by this system's biological, psychological, and social history. For example, this relationship will be influenced by prior and anticipated experiences, past social relations, and the individual's developmental phase. Brain, body, and environment, thus, mutually constitute and determinate each other, and they are mutually dependent (Northoff, 2003).

This ontological determination also applies to dissociative subsystems of personality. A dissociative part involves a co-constitution and co-determination of a subsystem that, as clinical observations suggest, strives to realize particular goals (see Figure 2). This subsystem consists in a particular intrinsic relationship, that is, in ongoing dynamic configurations of an individual's brain, body, and environment, as well as an intrinsic relationship of one dissociative part with other existing dissociative parts. These parts do not exist in a void, but constitute and determine each other in ontological regard. For example, as one part, a patient may not eat. Whether this part realizes it or not, he or she can only exist because there are other parts that do eat.

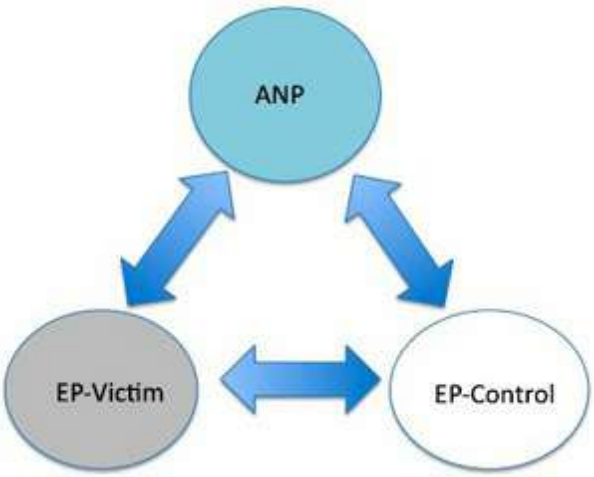


Figure 2. The trinity of dissociative parts of the personality: Three essential types:

* ANP = Apparently Normal Part of the Personality. As ANP, the patient focuses primarily on functioning in daily life. ANP is foremost mediated by action systems for daily life functioning such as energy management, exploration, and care taking. ANP typically fears and avoids EP-Victim, as well as EP-controlling. In some cases, ANP may verbally fight with EP-Control.

* EP-Victim = Emotional Part of the Personality that is fixated in the 'there and then,' that they often experience and regard as the actual 'here and now.' As EP-Victim, the patient's phenomenal self-model and world-model is that of an endangered child. As EP, the patient focuses primarily on surviving actual or perceived threat. For space, it is not discussed here that complex dissociation is a condition that relate to chronic traumatization, including attachment disruptions in early childhood-related condition (see, e.g., Chu, Frey, Ganzel, & Matthews, 1999; Diseth, 2006; Dutra, Bureau, Holmes, Lyubchik, & Lyons-Ruth, 2009; Nijenhuis & Den Boer, 2009; Ogawa, Sroufe, Weinfield, Carlson, & Egeland, 1997; Van der Hart et al., 2006. EP is foremost mediated by action systems for defense (flight, freeze, fight, playing dead) and attachment cry. EP-Victim's fear of ANP and EP-Controlling is proportional to ANP's and EP-controlling's rejection, as well as verbal and physical attacks.

* EP-Control = Emotional Part of the Personality that tends to imitate perpetrators in an effort to control the uncontrollable (i.e., traumatization, including attachment disruptions). EP-Control regards EP-Victim as weak, bad, and undeserving, and regards ANP in a similar fashion. EP-Control is afraid to realize that he or she was also hurt and abandoned, thus fears to realize that he or she is intimately related, that is, belongs to EP-Victim and ANP. EP-Control may be mediated by the action system of social dominance

Where is the mind? If there are intrinsic relationships of brain, body, and environment, where does this leave the mind? The tempting (Cartesian) belief that the mind could exist in separation of the body involves an epistemic illusion caused by our inability to know how we generate our mental contents, including our sense of self. This inability is known as transparency

(McGinn, 1989, 1998; Metzinger, 2003) or autoepistemic limitation (Northoff, 2003). Whereas there is no mind without a brain, the mind does not equal the brain. We tend to experience that our mind is in our head, but no one has found the mind in the brain. According to Alva Noë (2009, p. xiii):

Human experience is a dance that unfolds in the world and with others. You are not your brain. We are not locked up in a prison of our own ideas and sensations. The phenomenon of consciousness, like that of life itself, is a world-involving dynamic process. We are already at home in the environment. We are out of our heads.

"Consciousness isn't something that happens inside us: it is something that we do, actively, in our dynamic interaction with the world around us" (Noë, 2009, p. 24).

A feature that distinguishes dissociative parts from other subsystems of personality (e.g., the sympathetic nervous system) is that they are conscious and self-conscious (Nijenhuis, 2011). If the mind in mental health cannot be found in the brain, the mind of dissociative parts cannot be found in the brain or brain/body either (though not all would agree with this statement, e.g. Joseph 2009). The mind unfolds in dynamic configurations of brain, body, and environment, particularly in embedded actions that are ongoing when these parts are awake or dreaming.

Cause and Effect The fact that cause and effect are inseparable in the case of co-occurrence and co-constitution does not imply that there is no causation at all. Aristotle distinguished apart from efficient causation three other causes. Final cause involves the goal toward which something aims, hence pertains to the integration of the brain and body within the environment. For example, mediated by the limbic system of attachment, individuals seek protection by a caretaker in situations that they perceive as calling for this form of protection (Joseph 1992). These and other action systems bias individuals as a whole system toward particular perceptions, affects, and conceptions, and toward the effectuation of particular goals through action.

As Northoff (2003) puts it, goals are about observable and to-be effectuated events in the environment. Observable events pertain to sensory perception, and to-be effectuated events include more motor action. Goal-orientation involves sensorimotor integration, which cannot be captured in terms of efficient causation. Sensations/perceptions are not the linear and

physical cause of motor actions, and motor action is not the linear and physical cause of sensations/perceptions. Sensations/perceptions and motor actions rather have an ongoing effect on each other (Hurley, 1998). Moreover, physical activity such as patterns of brain activity does not reveal what the owner and agent of that activity was sensing and doing, and why. Sensorimotor integration or synthesis, more complex forms of integration, and goal-orientation (e.g., the aim to attach or defend) cannot be explained in physical terms, but involve final causes.

Formal cause describes what makes a particular 'thing' one sort of 'thing' and no other, and describes the kind of organization of the 'thing.' We thus do not simply respond to physical 'stimuli' and do not, like computers, 'process' 'information' understood as discrete, encapsulated, symbolic, and predefined, thus context-independent and context-isolated instructional codes. Rather, we are enactive complex systems that find or generate meaning in a dynamic and self-organizing fashion (Edelman & Tononi, 2000; Kelso, 1995; Thompson, 2007; Varela, Thompson, & Rosch, 1993).

As whole embodied and embedded biopsychosocial systems, we are associated with all four causes. As dynamic, self-organizing systems (formal cause), we are oriented toward observable events regarding which we aim to realize particular effects as guided by our goals (final cause). The material cause involves the physical material we are made of (e.g., cells). With regard to the brain, the efficient cause includes 'the force of the neural mechanisms by means of which different parts of the brain are specifically related to each other with the ultimate realization of self-organisation and dynamic pattern formation" (Northoff, 2003, p. 291).

Dissociative parts are also associated with all four causes. They are goal-oriented (final cause) and self-organizing (formal cause), they have an organic basis (material cause) and involve physical and neural mechanisms (efficient cause). Mediated by their goals, each dissociative part synthesizes its own kinds of perceptions, sensations, emotional feelings, thoughts, memories, and motor actions. Alternations among different parts thus go along with profound shifts in the quality and kind of syntheses, hence, shifts in consciousness.

Like mentally healthy individuals, dissociative parts also engage in the mental action of personification regarding particular perceptions, sensations, feelings, thoughts, memories, and motor actions (Van der Hart et al., 2006).

Personification is generating a phenomenal self-model (the raw feeling of being someone) and a more reflective self-model (Metzinger, 2003; Nijenhuis, 2011). While each dissociative part generates a self-model, they do not personify each other. They do not feel or grasp that they are parts of a whole, that they, so to speak, are the other parts as well (in an ontological sense), and should integrate these parts' mental and behavioral contents (e.g., that the memories 'of other parts' should also be(come) their memories) in an experiential and epistemological sense.

Each dissociative part involves its own kinds of dynamic configuration of brain/body/environment. For example, as one part but not as a different part, the patient may have personified the right arm of the body that the first part has mutilated. Shifts among these parts are thus associated with profound shifts in personification, hence, in the patient's sense of self, world, and self-in-the world. Personification includes the actions of experiencing and acception ownership ('this is my hand') and agency ('I move my hand').

Another mental action is presentification (Van der Hart et al., 2006), the demanding action of integrating one's past, present and future, such that the present is experienced as the most real. More than knowing, presentification includes taking the content of one's experience and knowledge into account with respect to one's current and future actions. The extent to which dissociative parts can and will engage in presentification is quite different. They may confuse past and present (as in re-enactment of traumatic experiences), fail to presentify past episodes (as in dissociative amnesia), or overlook impending dangers.

Does it make sense to study dissociative parts? In sum, ontologically, dissociative parts constitute interrelated but insufficiently integrated embrained, embodied, and environmentally embedded biopsychosocial structures, that is, subsystems of personality. They include their own phenomenal and epistemic sense of self, world, and self-in-the-world (Nijenhuis, 2011; Nijenhuis & Van der Hart, 2011). As conscious and self-conscious goal-directed subsystems, they are subject to all four Aristotelian causes.

Considering these features and their degree of relative autonomy, it makes logical sense to maintain that dissociative parts of a patient decide, think, feel, want, or do something, provided we realize that (1) they are subsystems of a higher-order system that constitutes the patient's personality, (2) they are

not totally separated from each other, (3) a full understanding of them involves an analysis of their mutual relations, and (4) a full understanding of the patient requires a structural and functional analysis of his or her personality as a whole biopsychosocial system.

3. Four Interrelated Epistemic Perspectives

Different dynamical configurations of brain, body, and environment account for our different epistemic abilities and inabilities. The first-person, quasi second-person, second-person, and third-person perspective are such configurations.

The first-person perspective (FPP) is about our phenomenal experience, and involves experiencing 'raw,' prereflective sensations and other feelings that are subjective, private, and internal. This perspective subserves living and experiencing of present events (Northoff, 2003). FPP involves our body as our spatial center, and our 'I' as the center of our mental states. In other words, FPP pertains to the action of generating the subjective feeling of being someone with a point of view, that is, of being an acting and experiencing self with a subjectively experienced outward perspective on his or her perceived environment, and an inward perspective regarding himself or herself (Metzinger, 2003). This someone involves our 'I' or 'self,' or phenomenal self-model. How this model is generated by some component of us as a whole system remains hidden, because the brain does not tell us how it generates its own states, including our 'I.' Due to this autoepistemic inability, we experience our phenomenal self and world as given.

Dissociative parts of the personality include their own FPP. They feel they are/have a self, and experience that their world is given. Subject to the described autoepistemic limitation, they are unable to experience that their syntheses, personifications and presentifications are personal constructions. However, for the observer, the constructive nature of these contents can be clear. For example, whereas dissociative parts experience they have their own body, observers will agree this is not the case.

Mentally healthy individuals can detect, recognize, and compare, that is, judge their our different phenomenal experiences and states (Chalmers, 1996). In Northoff's (2003) terms, this phenomenal judgment involves our Second-Person Perspective (SPP), or, as I say, our Quasi SPP (QSPP). QSPP is a form of intra-subjective communication, whereas FPP is about intra-

subjective experience. This intra-subjective communication serves, among others, for the development of a 'relation of mineness' (Metzinger, 1993). For example, in QSPP, we can say "I know this is my body." QSPP therefore involves a more objective self-model than the phenomenal self-model in FPP in which we might experience 'being cold' which may but need not be expressed as "I am cold." In FPP, personification--i.e., the mental actions of owning experience and agency--is prereflective. In QSPP, personification involves at least a phenomenal judgment of ownership (e.g., "My body hurts") and agency (e.g., "I run").

SPP pertains to the relationship between the 'I' of the own person and the 'I' of another person, the 'Thou' (Buber, 1983). Access to someone else's phenomenal experience exists, but is indirect, and involves actions such as empathy, joint perspective taking, and imitation. These actions include the activity of particular brain structures and functions, e.g., mirror and canonical neurons (Pineda, 2008), that mediate our phenomenal sense of being in mental/experiential touch with another individual.

QSPP and SPP are epistemic intermediates between phenomenal experience in FPP and physical judgment in TPP. In FPP, we are experientially and spatially centered in our body, provided we, for example, do not experience out of body phenomena, or somatoform anesthesia, as can happen in dissociative disorders. In QSPP, we are also centered in our body, but since we phenomenally judge our phenomenal experience, we are linked with, but also at some distance of our mental and bodily state. This bridge between phenomenal experience and physical judgment in QSPP allows us to modulate our emotional experiences.

Many dissociative parts can reach a level of functioning high enough to engage in phenomenal judgment regarding themselves and others. Thus, they have an explicit sense of self to the extent that they engage in personification, and they are oriented in phenomenal space and time to the extent that they engage in presentification. However, what healthy individuals phenomenally judged in terms of QSPP (e.g., this is my arm, memory, motor action), dissociative parts may phenomenally judge in terms of SPP (e.g., this is not my arm, memory, motor action, but it belongs to [an other dissociative part; I am not the others [i.e., the other dissociative parts]). Confusion between QSPP and SPP is a core feature of dissociative disorders.

A dissociative part may also regard an other part in Third-Person

Perspective (TPP). TPP does not include experiential and bodily centeredness, because in this epistemic perspective, we are not experientially--i.e., mentally and bodily--linked with ourselves, other individuals, other organisms, and immaterial objects. We engage in physical judgment in TPP, and cannot experience perceptions or perform motor actions (Northoff, 2003). For example, some neuroscientists tend to study the brain and its workings as physical objects in TPP. Clinicians assess patients' mental disorders in TPP, but engage in SPP when they are empathically attuned to patients in therapeutic encounters. As private persons, we may notice in TPP that our leg is broken and needs treatment, or that we are depressed or happy. In TPP, we thus observe and judge ourselves, other individuals, and objects as physical objects.

At least some dissociative parts can function at a mental level that is high enough to engage in TPP. For example, as such a part, a patient may be able to hold a job that requires the ability to engage in physical judgments. While this TPP is adaptive, dissociative parts also engage in maladaptive TPP. For example, when a dissociative part does not personify a different part that 'did not resist abuse,' he or she may physically judge that the other part is bad, and deserves punishment.

The different perspectives and the involved epistemic abilities and inabilities are interrelated. TPP is only possible on the basis of FPP, and in many cases QSPP and SPP as well. For example, scientists' TPP regarding their object of study can only exist in the framework of their FPP, QSPP, and SPP. Science would not exist without human prereflective (FPP) and reflective (QSPP/SPP) consciousness and self-consciousness. As discussed above, objects only exist in the awareness of subjects. Furthermore, QSPP/SPP depend on FPP because phenomenal judgment involves a judgment of phenomenal experience. Whereas FPP can exist without QSPP, QSPP can influence FPP because individuals' phenomenal experience tends to be affected by their phenomenal judgment.

Summary There are no selves, objects and events without experiencing and knowing subjects. Subjects include individuals whose personality is integrated, as well as conscious and self-conscious dissociative parts of an individual. Any 'self,' 'world,' and 'event' depends on an embrained, embodied, and embedded subject. Brain, body, and environment cannot exist by themselves, but exist in intrinsic relationships and dynamic configurations

of brain, body, and environment. How an individual and dissociative parts of an individual experience, perceive, and conceive these embedded selves, objects and events depends on their particular epistemic perspective: FPP, QSPP, SPP, and TPP. In epistemic regard, dissociative parts engage in underinclusive and/or overinclusive acts of synthesis, personification, and presentification.

4. Research of Consciousness and Self-Consciousness

Under the formulated restrictions, the study of dynamic configurations of brain, body, and environment in dissociation can contribute to an understanding of consciousness and self-consciousness. For example, this research includes comparisons between different dissociative parts with their own goal-orientation and epistemological features such as their different syntheses, and degrees and kinds of personification, and presentification. It also encompasses comparisons between dissociative parts and mentally healthy individuals.

Comparisons of different (types of) dissociative parts indicate what neural activity, brain structures, and behavioral patterns are associated with experiencing, perceiving, and knowing oneself, other selves, objects, and events in FPP, QSPP, SPP, or TPP. For example, these studies can find differences between dynamic configurations of brain, body, and environment for dissociative parts that do not synthesize (‘There is no arm’) or personify particular body parts (‘This is not my arm’), and those that do. Comparisons of dissociative parts and mentally healthy individuals can also document such correlates, which research is similar to comparisons of patients with structural brain defects and healthy individuals (e.g., Gallagher, 2005). For example, by comparing the neural activity of dissociative parts with a deficient phenomenal self-model and mentally healthy individuals with an adequate phenomenal self-model, it may be found what neural activity is associated with the generation of an adequate FPP and QSPP. Both subtypes of research can contribute to an understanding that the normal phenomenal sense of self, world, and self-in-the-world involve ongoing constructions, developed in interaction with a material and social environment.

Studies of dissociative parts are possible and fruitful. For example, different resting state patterns of neural activation patterns have been found for DID patients, functioning as ANP, and healthy controls (Sar, Unal, &

Ozturk, 2007). This kind of research can document what brain structures and functions are associated with normal and abnormal resting states of (self)consciousness. The study of task-related states of (self)consciousness in dissociation and normality is also within reach. We had two different types of dissociative parts in women with DID listen to neutral and trauma memory scripts (Reinders et al., 2003, 2006, 2008). These types involved a part oriented to achieving goals of daily life, and a part oriented to physical defense in the form of foremost sympathetically mediated tendencies to flight and freeze. Theoretically, these types are described as Apparently Normal Parts (ANP) and Emotional Parts (EP)(Van der Hart et al., 2006). For ANP only the neutral memory script, and for EP both scripts pertained to personal experiences. ANP and EP had indistinguishable subjective, psychophysiological and neural reaction patterns for listening to the neutral memory script, but their respective reactions to the trauma memory script were, as was theoretically predicted, very different. Broadly speaking, EPs but not ANPs had strong phenomenal and psychophysiological reactions, as well as more subcortical (caudate, amygdala) and less cortical activation than ANPs. These differences were not due to role-playing, suggestion, and fantasy proneness, as some scientists have suggested (Giesbrecht, Lynn, Lilienfeld, & Merckelbach, 2008; Lilienfeld et al., 1999; Merckelbach, Rassin, & Muris, 2000; Piper & Merskey, 2004): neither high nor low fantasy prone mentally healthy women instructed to simulate ANP and EP had psychophysiological and neural reaction patterns that characterized authentic ANPs and EPs (Reinders et al., 2008).

Studies of phenomenal self-models and lack of personification in dissociative disorders and health are feasible as well. Thus, we currently prepare a study of biopsychosocial reactions of ANP and EP to audiotaped ANP's, EP's, a friend's, and a stranger's self-spoken self-descriptions. Healthy controls will listen to audiotaped self-spoken self-descriptions, and self-descriptions of a friend and a stranger. This work will allow us to explore what neural structures and patterns are involved in correct and incorrect discriminations of QSPP (I-me), SPP (I-other dissociative part/I-friend), and TPP (I-stranger).

5. Conclusion

Theoretical considerations and pioneering empirical work suggest that

studies of dissociation can contribute to an understanding of consciousness and self-consciousness as phenomena implied in particular ongoing actions. Ontologically, this study examines dynamic configurations of the intrinsic relationships of brain, body, and environment, that is, links between mental, behavioral, (psycho)physical, and neuronal states, and the actions that generate these states (Joseph 2009; Northoff, 2003). Epistemically, the focus of this work is on the differences and interdependency of FPP, QSPP, SPP, and TPP. The theory of dissociation of the personality—for space only minimally introduced in this article-can serve as a solid heuristic with regard to these explorations.

With some exceptions (e.g., Edelman & Tononi, 2000; Metzinger, 2003), the possibility of this study is hardly realized to date. For example, there are only a handful neuroimaging studies of DID, whereas there are about a thousand neuroimaging studies of schizophrenia, a disorder with a similar prevalence. Realization of the relevance of complex dissociative disorders for the study of consciousness and self-consciousness would be most rewarding for philosophy, science, and the wellfare of patients with these severe conditions alike.

References

American Psychiatric Association (1994). DSM-IV. Washington, DC: American Psychiatric Press.

Bennett, M.R. & Hacker, P.M.S. (2003). Philosophical foundations of neuroscience. Oxford: Blackwell.

Bohr, N. (1958/1987), Essays 1932-1957 on Atomic Physics and Human Knowledge, reprinted as The Philosophical Writings of Niels Bohr, Vol. II, Woodbridge: Ox Bow Press.

Buber, M. (1983). Ich und Du. 11. durchgesehene Auflage. Heidelberg: Lambert Schneider.

Chalmers, D.J. (1996). The conscious mind: In search of a fundamental theory. New York: Oxford University Press.

Dell, P.F. (2006). A new model of dissociative identity disorder. Psychiatric Clinics of North America, 29, 1–26.

Descartes, R. (1960). Discourse on Method and Meditations. New York:

The Liberal Arts Press.

Edelman, G. M., & Tononi, G. (2000). A universe of consciousness: How matter becomes imagination. New York: Basic Books.

Fanselow, M.S. & Lester, L.S. (1988). A functional behavioristic approach to aversively motivated behavior: Predatory imminence as a determinant of the topography of defensive behavior. In R.C. Bolles & M.D. Beecher (Eds.), Evolution and learning (pp.185-212). Hillsdale, NJ: Erlbaum.

Fuster, J.M. (2003). Cortex and mind: Unifying cognition. New York: Oxford University Press.

Gallagher, S. (2005). How the body shapes the mind. New York: Oxford University Press.

Garcia-Campayo, J., Fayed, N., Serrano-Blanco, A., Roca, M., (2009). Brain dysfunction behind functional symptoms: neuroimaging and somatoform, conversive, and dissociative disorders. Current Opinion in Psychiatry 22 (2): 224.

Giesbrecht, T., Lynn, S.J., Lilienfeld, S.O., & Merckelbach, H. (2008). Cognitive processes in dissociation: An analysis of core theoretical assumptions. Psychological Bulletin,134, 617-647.

Hermans, E.J., Nijenhuis, E.R.S., Van Honk, J., Huntjens, R., & Van der Hart, O. (2006). State dependent attentional bias for facial threat in dissociative identity disorder. Psychiatry Research, 141, 233-236.

Heisenberg, W. (1958), Physics and Philosophy: The Revolution in Modern Science, London: Goerge Allen & Unwin.

Hughes, J.R., et al., (1990). Brain mapping in a case of multiple personality". Clinical EEG, 21 (4): 200–209.

Hurley, S.L. (1998). Consciousness in action. Cambridge MA: Harvard University Press. Janet, P. (1889). L'automatisme psychologique. Paris: Félix Alcan.

Janet, P. (1935). Réalisation et interpretation [Realization and interpretation]. Annales Médico-Psychologiques, 93, 329-366.

Joseph, R. (1988a) The Right Cerebral Hemisphere: Emotion, Music, Visual-Spatial Skills, Body Image, Dreams, and Awareness. Journal of Clinical Psychology, 44, 630-673.

Joseph, R. (1988b). Dual mental functioning in a split-brain patient. Journal of Clinical Psychology, 44, 770-779.

Joseph, R. (1992) The Limbic System: Emotion, Laterality, and

Unconscious Mind. The Psychoanalytic Review, 79, 405-455.

Joseph, R. (2009). Quantum Physics and the Multiplicity of Mind: Split-Brains, Fragmented Minds, Dissociation, Quantum Consciousness, Journal of Cosmology, 3, 600-640.

Kant, I. (1998). Critique of pure reason. Cambridge, MA: Cambridge University Press. Kelso, J.A.S. (1995). Dynamic patterns: The self-organization of brain and behavior. Cambridge, MA: MIT Press.

Kluft, R.P. (1987). First-rank symptoms as a diagnostic clue to multiple personality disorder. American Journal of Psychiatry,144(3), 293–298.

Lang, P.J., Bradley, M.M., & Cuthbert, B.N. (1998). Emotion, motivation, and anxiety: Brain mechanisms and psychophysiology. Biological Psychiatry, 44, 1248-1263.

Lapointe, A.R., et al., (2006). Similar or disparate brain patterns? The intra-personal EEG variability of three women with multiple personality disorder". Clinical EEG and Neuroscience, 37 (3): 235–242.

Lilienfeld, S.O, Lynn, S.J., Kirsch I, Chaves JF, Sarbin TR, Ganaway GK, & Powell RA (1999). Dissociative identity disorder and the sociocognitive model: recalling the lessons of the past. Psychological Bulletin, 125, 507-523.

Mathew, R.J., Jack, R.A., West, W.S. (1985). Regional cerebral blood flow in a patient with split personality". The American Journal of Psychiatry 142 (4): 504–505.

McGinn, C. (1989). Can we solve the mind-body problem? Mind, 98, 349-366.

McGinn, C. (1999). The mysterious flame: Conscious minds in a material world (1st ed.). Oxford, UK; Cambridge, MA, USA: B. Blackwell.

Merckelbach, H., Rassin, E., & Muris, P. (2000). Dissociation, schizotypy, and fantasy proneness in undergraduate students. Journal of Nervous and Mental Disease, 188, 428-431.

Metzinger, T. (2003). Being no one: The self-model theory of subjectivity. Cambridge, MA: MIT Press.

Neuman, Y., and Tamir, B. (2009). On Meaning, Consciousness and Quantum Physics. Journal of Cosmology, 2009, 3, 540-547.

Northoff, G. (2003). Philosophy of the brain: The brain problem. Amsterdam/Philadelphia: John Benjamins.

Nijenhuis, E.R.S. (2004). Somatoform dissociation: Phenomena,

measurement, and theoretical issues. New York: Norton.

Nijenhuis, E.R.S. & Den Boer, J.A. (2009). Psychobiology of traumatization and trauma related structural dissociation of the personality. In P. Dell & J. O'Neil (Eds.) Dissociation and dissociative disorders: DSM-IV and beyond. Oxford: Routledge.

Nijenhuis, E.R.S. & Van der Hart (2011). Dissociation in trauma: A new definition and comparison with previous formulations. Journal of Trauma and Dissociation. In press.

Nijenhuis, E.R.S., Van der Hart, & Steele, K. (2002). The emerging psychobiology of trauma related dissociation and dissociative disorders. In H. D'Haenen, J.A. Den Boer, & P. Willner (Eds.), Biological Psychiatry (pp. 1079-1098). London: Wiley.

Nijenhuis, E.R.S. (2011). Consciousness and self-consciousness in dissociative parts of the personality. In V. Sinason (Ed.), Attachment, trauma, and multiplicity. London: Routledge.

Noë, A. (2009). Out of our heads. New York: Hill and Wang.

Panksepp, J. (1998). Affective neuroscience: The foundations of human and animal emotions. New York: Oxford University Press.

Pineda, J.A. (2008). Sensorimotor cortex as a critical component of an 'extended' mirror neuron system: Does it solve the development, correspondence, and control problems in mirroring? Behav Brain Funct, 4, 47.

Piper, A., & Merskey, H. (2004). The persistence of folly: Critical examination of dissociative identity disorder. Part II. The defence and decline of multiple personality or dissociative identity disorder. Canadian Journal of Psychiatry, 49, 678-683.

Reinders, A.A.T.S., Nijenhuis, E.R.S., Paans, A.M.J., Korf, J., Willemsen, A.T.M., & Den Boer, J.A. (2003). One brain, two selves. NeuroImage, 20, 2119-2125.

Reinders, A.A.T.S., Nijenhuis, E.R.S., Quak, J., Korf, J., Paans, A.M.J., Haaksma, J., Willemsen, A.T.M., & Den Boer, J. (2006). Psychobiological characteristics of dissociative identity disorder: A symptom provocation study. Biological Psychiatry, 60, 730-740.

Reinders, A.A.T.S., van Eekeren, M., Vos, H., Haaksma, J., Willemsen, A., den Boer, J., Nijenhuis, E. (2008). The dissociative brain: Feature or ruled by fantasy? Proceedings of the First International Conference of the European

Society of Trauma and Dissociation. Amsterdam, April 17-19, p. 30.

Reinders, A.A.T.S., Willemsen, A.T.M., Vos, H.P.J., den Boer, J.A., & Nijenhuis, E.R.S. (submitted). Is dissociative identity disorder fake or fact? A psychobiological study of simulated and pathological dissociative identity states.

Ross, C.A., Miller, S.D., Reagor, P., et al. (1990). Schneiderian symptoms in multiple personality disorder and schizophrenia. Comprehensive Psychiatry, 31 (2),111–118.

Sacks, O. (1984). A leg to stand on. London: Duckworth.

Sar, V., Unal, S.N., & Ozturk, E. (2007). Frontal and occipital perfusion changes in dissociative identity disorder. Psychiatry Research, 156(3), 217-223.

Schopenhauer, A. (1958). The world as will and representation. Vol. I and II. Clinton, MA: The Falcon's Wing Press.

Schopenhauer, A. (2007). On the fourfold root of the principle of sufficient reason. New York: Cosima.

Spinoza, B. de (1996). Ethics. London: Penguin Books.

Stapp, H. P. (2009). Quantum Reality and Mind. Journal of Cosmology, 3, 570-579.

Thompson, E. (2007). Mind in life: Biology, phenomenology, and the sciences of mind. Cambridge, MA: Belknap Harvard.

Van der Hart, O., Nijenhuis, E.R.S., & Steele, K. (2006). The haunted self: Structural dissociation and the treatment of chronic traumatization. New York: Norton.

Van der Kolk, B.A., & Van der Hart, O. (1989). Pierre Janet and the breakdown of adaptation in psychological trauma. American Journal of Psychiatry, 146, 1530–1540.

Van Gelder, T. (1995). What might cognition be, if not computation? Journal of Philosophy, 91, 345-381.

Varela, J., Thompson, E., & Rosch, E. (1993). The embodied mind: Cognitive science and human experience. Cambridge, MIT Press.

Wittgenstein, L. (1953). Philosophical investigations. New York: The MacMillan Company.

9. The Big Dream

by Kelly Bulkeley
San Francisco Theological Seminary, The Graduate Theological Union, California.

Introduction

Much of the pioneering research in the new field of neurotheology has focused on the practice of meditation and prayer, with special attention to the mystical states that can be generated by the concentrated efforts of experienced practitioners (Benson 1975; Benson 1996; Albright 1997; Austin 1998; Newberg 2001). . The research presented in this chapter has a specific focus on the study of "big dreams." That term was coined by C.G. Jung (Jung 1975), and since his time other researchers have investigated this same realm of dreaming using a variety of different terms: "intensified dreams" (Hunt 1989), "impactful dreams" (Sikora 1993), "highly significant dreams" (Knudson 2001), "extraordinary dreams" (Bogzaran 2002), and "apex dreaming" (Nielsen 2000). My contributions to this growing lexicon have been "root metaphor dreams" (Bulkeley 1994; Bulkeley 1999) and"most memorable dreams" (Bulkeley 2000). Although differing somewhat in their conceptual emphases, all these terms point to the existence of a cluster of relatively rare but widely experienced dream types involving 1) unusually intense emotions and physiological sensations, 2) striking visual images combining bizarreness, beauty, chaos, and order, and 3) a high degree of memorability upon awakening.

For researchers in neurotheology, the study of big dreams (I will use Jung's term for the remainder of this chapter) has several appealing features:

*Big dreams are frequently reported by "ordinary" people, not just by religious virtuosi or highly trained practitioners.

*Big dreams are reported in virtually every religious and cultural tradition throughout history, and are still reported by people in contemporary Western

society.

*Big dreams are clearly grounded in the neural activity of the brain during sleep, a fact that opens the way to using sleep research technologies to investigate the neurological processes that produce such religiously and spiritually charged experiences.

*The universality of big dreams, combined with their rootedness in the brain, strongly suggest the possibility that such dreams serve powerful adaptive functions that can be explained and understood in evolutionary terms.

These are all features that favorably distinguish the study of big dreams from the study of meditation and prayer. In identifying these features I do not mean to diminish the significance of those practices. Nor do I mean to propose big dreams as a new paradigm for uncovering the "essence" or "origin" of religion. I simply want to highlight the fact that dreams are another type of religious phenomenon that must be accounted for by any neurotheological theory that aspires to a comprehensive view of human religiosity.

I also do not want these differences to overshadow the potential of the study of big dreams to make use of many of the same imaging techniques that have been applied with such impressive results to meditation and prayer. Such experimental efforts have not yet been made, in large part because neuroscientists with access to the extremely expensive and technologically complex brain imaging machinery have had neither the time nor the inclination to pursue such questions. That will likely change soon, as the research technology becomes less expensive and easier to use outside a laboratory setting, and as investigators in neurotheology continue their work showing that the neurophysiological correlates of various types of religious and spiritual experience reveal important modes of brain-mind functioning that have not yet been recognized and/or understood by mainstream cognitive neuroscience. A primary goal of this chapter is to outline a conceptual framework for this coming generation of neurotheological research on big dreams.

One of the few researchers who has devoted attention to the interaction of neural and religious factors in dreaming is R. Joseph (Joseph 1996, 2001, 2011), who has pointed out that the high degree of limbic activation in REM sleep is consistent with the prominent role of the limbic system in various

forms of religious experience. More specifically, Joseph suggests that the right hippocampus and amygdala play special roles in the formation of religious imagery, and this may be true in dreams as well, where right hemispheric activity appears to be relatively high. "[I]t appears that there is a specific complementary relationship between REM sleep, hallucinations, mystical experiences, and right temporal (and thus right amygdala and hippocampus) electrophysiological activity." (112)

This chapter will follow up on those suggestions by Joseph, as well as on the insights of Jung, Hunt, Kuiken, Knudson, Krippner and Bogzaran, and other researchers who have undertaken the study of big dreams. First I will survey the occurrence of big dreams in various religious and cultural traditions, considering both their geographic diversity and their experiential phenomenology. Then I will review current neuroscientific research on the nature and function of human dreaming, with special attention to the Activation-Synthesis model of J. Allan Hobson and the clinico-anatomical research of

Mark Solms. Having laid out the religious and neuroscientific material I will go on to identify several critical points of connection between the two, and I will point to several questions meriting future research. I will conclude the chapter by offering a new model for understanding the formation, function, and interpretation of big dreams.

DREAMS IN THE HISTORY OF RELIGIONS

This section reviews the findings of researchers in religious studies, anthropology, and history regarding various kinds of dream experiences recorded in different places and times. The review starts with a consideration of the roles that dreams and dreaming have played in major religious faiths and cultural traditions. Then the analysis shifts to a consideration of several cross-cultural and perhaps universal features in the experience of spiritually transformative dreams.

The Ancient Near East

The earliest evidence for dreams in ancient Mesopotamia is a monument built by King Eanatum I (ca. 2454-2425 B.C.E.) in which he commemorates his latest military victory and recounts how the god Ningirsu appeared beside his head in a dream and guaranteed his success in battle (Noegel 2001, 46). In

ancient Egypt the first appearance of dreaming in a surviving text comes in a group of documents known as "Letters to the Dead." Dating to the First Intermediate Period (2150-2055 B.C.E.), these texts were written to deceased relatives, who are said to appear in the dreams of the living, sometimes in unpleasant ways (Szpakowska 2001). The Egyptian word for dreams used in these texts is rusut, and Szpakowska explains the significance of this term: "Interestingly, resut is most often determined by an open eye, which is also used for words related to visual perception (such as 'see,' 'be vigilant'). The other term meaning dream was qed, which derived from the word 'sleep.' When this word meant 'sleep,' it was followed by the sign of a bed, but when it meant 'dream,' it used the same open eye sign as resut. An Egyptian could also refer to a dream indirectly by saying that someone came and spoke while the person was sleeping, or that he saw or heard something and then woke up." (31) Szpakowska goes on to point out that the ancient Egyptians had no verb "to dream," and spoke instead of the noun "dream" as something seen, an object of visual perception existing outside the will of the passive dreamer. (31)

The social diversity of the authors of the "Letters to the Dead" is something of an exception in the Ancient Near East dream literature, as the majority of reports are, like the dream of Eanatum I, attributed to kings, priests, and military leaders. These reports generally involve a direct message from a god in which the dreamer passively receives reassurance, guidance, warning, and/or information about the future (Oppenheim 1956; Noegel 2001). The dreams are generally positive in tone, and nightmares are rarely reported, although they play a central role in one of the era's greatest epic poems, the Epic of Gilgamesh (Bulkeley 1999).

Although relatively few reports have survived of dreams from a wider portion of the population, the existence of several manuals of dream interpretation indicate some degree of interest in the subject among the general public. The practical, "how-to" nature of these manuals is indicated by their intimate focus on the details of people's personal lives (their health, sexuality, family relationships, concerns with money and status) and their prescription of various rituals, prayers, and magical formulae to remove the ill effects of bad dreams (Oppenheim 1956; Noegel 2001; Szpakowska 2001). Analyzing a text referred to as the Babylonian Dream Book, Noegel gives the following abbreviated list of types of dream experience described and

interpreted in the book: "[U]rinating, having sex, flying, visiting certain temples and towns, seeing the dead and the divine, ascending to the heavens, descending to the underworld, carrying objects, standing or sitting in a particular place, turning into various animals, eating and drinking particular items, making objects, performing a particular occupation, seeing animals, being given objects, seeing astronomical bodies, and felling trees and plants."

The interpretive strategies used to translate dream images into practical meanings involved various techniques of linguistic association, most commonly punning and the pairing of similars and opposites. Emphasis was put on the dreamer's occupation, state of mind, status, and personal situation, and interpreters were warned that the same dream image could express different meanings for different people. Although the manuals provided various classificatory systems for dream phenomenology, they all shared the basic assumption that some dreams were more closely related to personal daily life while other dreams involved interactions with divine beings, realities, and powers.

In addition to the interpretation manuals, numerous texts have been found that provide instructions for performing rituals (namburbu) that could evoke favorable dreams from the gods in which the dreamer received divine blessings, insights into the future, and the power to ward off demons and bad dreams (Noegel 2001). These rituals typically invoked the gods of fire, light, or magic, and they involved the preparation of the sleeper by use of such methods as purification, prayer, repeating incantations, and creating magical amulets and figurines. Underlying the use of both rituals and interpretation manuals is the widespread Mesopotamian belief that dreaming could be used to promote a person's health. "The very act of interpreting dreams, like the namburbu rituals, was therapeutic. By 'solving' the puzzling dream, the interpreter 'dissolved' its harmful consequences and thus 'resolved' the dreamer's health" (Noegel 2001).

Judaism

Within this broader Ancient Near Eastern context, Judaism emerged some time after 2000 B.C.E. as a new religious and ethnic tradition shaped in large part by long experiences of exilic wandering. According to the Hebrew Bible, dreams had a directly formative impact on the lives of several of the tradition's founding patriarchs. Numerous Biblical texts present dreaming as

a privileged medium by which God communicates with humans. Abram's experience of "a dread and great darkness" falling upon him (Gen. 15), Jacob's dream of the heavenly ladder (Gen. 28), Samuel's experience in the temple of the Lord (1 Sam. 3), and Solomon's dream at Gibeon (1 Kings 3) all describe experiences in which the dreamer receives an awe-inspiring revelation of divine power and majesty. (These Biblical dream theophanies are precisely the kinds of experience Rudolf Otto had in mind when he developed the concept of "the numinous" in his book The Idea of the Holy (Otto 1958). Other types of dreams reported in the Hebrew Bible involve predictions for the future (Gen. 37, 41), reassurance in times of military conflict (Judges 7), and disturbing, ominous nightmares (Gen. 20, Job 7, Dan. 4).

The Hebrew Bible presents two accounts of the practice of dream interpretation. In the first, Joseph interprets the dreams of the baker and the butler (Gen. 40) and the Pharaoh (Gen. 41), translating the concrete images of their dreams (e.g. wine cups, bread baskets, cows, ears of grain) into symbolic predictions for their future. In the second, Daniel performs the feat of not only interpreting King Nebuchadnezzar's dream but also knowing what the dream is before the King tells him (Dan.

2). Like Joseph, Daniel translates the imagery of the dream (a "great image....mighty and of exceeding brightness, stood before you" (Dan. 2:31)) into a symbolic prediction for Nebuchadnezzar's future. Also like Joseph, Daniel attributes his interpretive skills to God's inspiration and guidance (Gen. 41:16, Dan. 2:28).

In addition to these affirmations of the religious value of dreams, the Hebrew Bible includes several passages expressing deep skepticism toward dreams. Numbers 12:6-8 refers to dreams as potentially deceptive "dark speech. In Ecclesiastes 5:3 it is said, "For a dream comes with much business, and a fool's voice with many words." Psalm 73 dismisses dreams as vain illusions-"on awaking you despise their phantoms." The prophet Jeremiah castigates those people (rival prophets?) who falsely claim to know of God's will through their dreams (Jer. 23). Although Solomon's dream at Gibeon follows the classic pattern of an Ancient Near Eastern dream incubation (Oppenheim 1956, Patton 2002), Samuel's surprising encounter with God in the Temple reflects an implicit repudiation of dream incubation as unbefitting the autonomy and majesty of the Jewish God (Bulkeley 1995)

(See also Isa. 65:4).

For many centuries rabbinic commentators have been elaborating on these Biblical dream themes. Tractate Berakhot from the Babylonian Talmud (ca. 600 C.E.) has been especially influential in the Jewish tradition (Friedan 1990; Harris 1994). This text offers detailed explanations for interpreting dreams using verbal associations, puns, and scriptural allusions, and it also provides instructions on rituals to reverse the negative effects of bad dreams. Berakhot portrays dreams as valuable sources of insight into both to the dreamer's personal life (e.g., health, sexuality, family relations) and to his or her religious faith. However, the text repeatedly emphasizes that the process of interpreting dreams is very difficult and complex; dreams are always enigmatic and distorted, because "just as there is no wheat without straw, so there is no dream without worthless things" (Ber. 55a). Dreaming has remained a topic of interest among Jewish philosophers and theologians from Philo (born ca. 20 B.C.E.) to Moses Maimonides (1135-1204 C.E.) and, some have argued, all the way to Sigmund Freud (Bakan 1958; Covitz 1990; Friedan 1990; Harris 1994; Hasan-Rokem 1999; Idel 1999; Brill 2000).

Graeco-Roman Traditions

The roots of archaic Greek dream beliefs reach at least as far back as Hesiod's Theogony (ca. 725 B.C.E.), a poetic creation myth in which it is said that "Night bore frightful Doom and the black Ker [a spirit of death]/And Death, and Sleep, and the whole tribe of Dreams." (vv. 211-212) (Hesiod 1973). Homer's epic poems The Odyssey and The Iliad (ca. 800 B.C.E.) make numerous references to dreams, portraying them as divine revelations (Od. 4:884-946), vivid emotional experiences of frustration and sadness (Il. 22:199-201, Il. 23:54-107), and sources of deception and manipulation (Il. 2:1-83, Od. 19) (Bulkeley 2001).

The development of the Greek philosophical tradition brought a new degree of critical analysis to the nature and functions of dreaming. A famous passage in book IX of Plato's Republic uses common dream experience as a means of insight into the hidden depths of human nature: "[A] terrible, fierce, and lawless class of desires exists in every man, even in those of us who have every appearance of being decent people. Its existence is revealed in dreams" (IX.571-572) (Plato 1957)

Aristotle (384-322 B.C.E.) offered a naturalistic explanation for dreaming:

When we sleep our faculties of sense perception and intellectual analysis suspend their ordinary functions, allowing the echoes of emotionally charged perceptions to reverberate through our minds and become new objects of perception, i.e. dreams (Aristotle 1941; Aristotle 1941b). Both Plato and Aristotle express disdain for supernatural explanations of dreaming, although both acknowledge the potentially valuable insights to be gained from at least some dreams-the Republic says that a man with a rational, well-ordered soul is able to have special dreams in which "he comes nearer to grasping truth than at any other time" (336), and Aristotle views dreams as distorted but interpretable expressions of people's emotional preoccupations. In this the two philosophers may have been following the lead of their mentor Socrates (469-399 B.C.E.), who told his friends of two dreams he had in prison-a recurrent dream of being told to "practice and cultivate the arts" (Phaedo 60-61) (Plato 1961) and a dream of a beautiful, white-clad woman accurately predicting the date of his execution (Crito 43-44) (Plato 1961) (see also (Bulkeley 1998b).

The best evidence for interest in dreams among the general Greek population comes from the temples of the healing god Asklepius, which were vital centers for the ritual practice of dream incubation (Jayne 1925; Dodds 1951; Oppenheim 1956; Meier 1967; Edelstein 1975; Miller 1994; Cancik 1999; Patton 2002). Hundreds of these temples thrived on the mountains, coasts, and islands of the Mediterranean during the final centuries of classical Greek culture and throughout the era of imperial Rome. The young Roman rhetorician Aelius Aristides (117-189 C.E.) practiced dream incubation at several Asklepian temples, and in his Sacred Tales he describes the busy operations at the grandly designed, well-staffed sanctuaries where people suffering from a variety of physical and emotional troubles came to purify themselves, sleep in the serpent-strewn temple, and pray to Asklepius for a dream of revelation and healing (Aristides 1981). The temples themselves were adorned with enthusiastic testimonials from visitors who received the sought-for dreams and were healed of their ills.

The popular practice of dream interpretation seems to have enjoyed a special flourishing during the height of the Roman empire, to judge by the Oneirocriticon of Artemidorus of Daldis (born ca.200 C.E.) (Artemidorus 1975; Grottanelli 1999; Walde 1999). Artemidorus refers to many other dream books circulating through the Mediterranean at that time, and he

mentions his involvement with a large population of professional dream interpreter's working in various cities and countries.

His Oneirocriticon is intended to codify the wisdom of those other books and interpreters and provide a detailed manual for the professional practice of dream interpretation. Included in the text are descriptions of different categories of dreams (future-oriented vs. present-oriented, direct vs. allegorical), explanations of punning and wordplay, reminders to pay close attention to the personal circumstances of the dreamer, and canny advice about maintaining a professional reputation. The main body of the Oneirocriticon is an extensive catalog of different dream images and their possible meanings-going blind, losing teeth, flying, being beheaded, engaging in a wide variety of sexual acts, and having encounters with animals, gods, and mythological beasts, among many, many other categories. Many of Artemidorus' interpretations follow the Asklepian beliefs and the medical tradition of Hippocrates, Rufus, and Galen in attributing to dreams the power of diagnosing illness (Achmet 1991; Walde 1999). Although the Oneirocriticon is meant as a training manual and reference guide, Artemidorus emphasizes that personal experience is essential to effective dream interpretation: "I maintain that it is necessary for the interpreter of dreams to have prepared himself from his own resources and to use his native intelligence rather than simply to rely upon manuals" (Artemidorus 1975).

Christianity

The founder of the religion, Jesus of Nazareth (died ca. 30 C.E.), is not reported in the New Testament as having experienced any dreams, possibly because he had none to report and possibly because the writers of the Gospels wanted to emphasize his uniquely immediate connection to God, even greater than the connection enjoyed by Moses in the Hebrew Bible, who is said to have spoken to God "mouth to mouth, clearly, and not in dark speech" like dreams (Num. 12:8). One of the Gospels, however, presents the story of Jesus' birth as directly shaped by several heaven-sent dreams warning his parents of threats against them and the life of their newborn child (Matt. 1:20-24, 2: 12, 13, 22). Dreams also serve as a source of divine guidance in the missionary work of Paul, directing him to visit certain regions, warning him of potential dangers, and reassuring him in times of anxiety (Acts 16:9, 18:9-11, 23:11, 27:23-25). Indeed, Paul's original conversion experience on

the road to Damascus (Acts 9) became the preeminent model for conversion to the Christian faith, and over the centuries, wherever Christianity has spread, people have reported intense, revelatory dreams in which God appeared to them and compelled them to adopt the new religion (Peel 1968; Osborne 1970; Lanternari 1975; M'Timkulu 1977; Fisher 1979; Curley 1983; Kelsey 1991; Shaw 1992; Miller 1994.)

One of the early converts was Jerome (ca. 347-420), a well-educated young man who reported a startling dream in which he was brought before the judgment seat of God, accused of being "a follower of Cicero and not of Christ," and scourged by repeated strokes of the lash until he made a vow to reject all worldly books and devote himself exclusively to Christianity (Kelsey 1991). Despite the powerful impact of this dream on his own life ("thenceforth I read the books of God with a zeal greater than I had previously given to the books of men" (137)), or perhaps precisely because its transformative impact, Jerome, who went on to become a powerful church bishop, denounced the dream incubation practices that were still popular throughout the Mediterranean world and condemned people who "sit in the graves and the temples of idols where they are accustomed to stretch out on the skins of sacrificial animals in order to know the future by dreams, abominations which are still practiced today in the temples of Asklepius" (137) (Miller 1994).

This basic theological tension-between a respect for the divine power of dreams and a deep fear of being deceived or misled by them-pervades the Christian tradition right into the present day. For many theologians the key concern is the inescapable nature of sexuality in dreams. St. Augustine (354-430 C.E.) laments in his autobiographical Confessions that even though he has, like Jerome, converted from paganism to Christianity and has pledged himself to a life of chastity, he is still plagued by disturbingly vivid sexual dreams: "But in my memory of which I have spoken at length, there still live images of acts which were fixed there by my sexual habit. These images attack me. While I am awake they have no force, but in sleep they not only arouse pleasure but even elicit consent, and are very like the actual act. The illusory image within the soul has such force upon my flesh that false dreams have an effect on me when asleep, which the reality could not have when I am awake. During this time of sleep surely it is not my true self, Lord my God?" (X.xxix(40)) (Augustine 1991). St. Thomas Aquinas (1225-1274)

follows Aristotle in explaining many dreams (particularly sexual dreams) as nothing more than the unfortunate by-products of ordinary bodily processes, and he adds to Aristotle the Christian belief that dreams of sexual temptation are sent by the devil to lure the faithful astray. However, in the Summa Theologica Aquinas admits that divine revelations in dreams are possible: "This can be seen in the fact that the more our soul is abstracted from corporeal things, the more it is capable of receiving abstract intelligible things. Hence in dreams and alienations of the bodily senses, divine revelations and foresight of future events are perceived the more clearly." (1.Q-12.11) (Kelsey 1991) Protestant reformer Martin Luther (1483-1546) refused to have anything to do with the seeming revelations of dreams: "I care nothing about visions and dreams. Althugh they seem to have meaning, yet I despise them and am content with the sure meaning and trustworthiness of Holy Scripture" (Luther 1945).

Despite these theological misgivings, at the popular level Christian interest in dream continued to exist, although people had reason to be prudent about talking too openly about their dreams-the Malleus Malificarum, the fifteenth-century manual used by the inquisitors to detect and hunt down witches, lists dreams as one medium by which demons operate (Sprenger 1971). For the most part, dream incubation practices continued unabated, and in many cases the rituals were performed in Asklepian temples that had been reconsecrated as shrines to Christian saints and martyrs(Achmet 1991). New manuals of dream interpretation were produced, including a text called the Oneirocriticon, written by a Christian named Achmet in tenth-century Byzantium who essentially copied the basic framework of Artemidorus' manual and filled it in with references to Christian scriptural and iconographic sources (Achmet 1991). These ritual and interpretive practices gave new theological expression to the same themes found in the earlier traditions regarding dreams as a source of revelation, guidance, warning, healing, and possible deception. Looking at Christianity today in Western Europe and North America, the dream theory of C.G. Jung can be viewed as a psychological elaboration of those basic religious themes (Jung 1965; Jung 1975), and his theory has in turn reignited Christian theological and popular interest in dreaming (Sanford 1982; Taylor 1983; L.M. Savary 1984; Kelsey 1991; Taylor 1992; Hall 1993) .

Islam

The Muslim faith emerged in seventh century C.E. Arabia as a profound revisioning of early Jewish and Christian traditions. One theme the religion's founder, the Prophet Muhammed (570-632), drew from the scriptures of those two traditions was a reverence for dreaming. In Islam's foundational text the Qur'an (610-632) dreams serve as a vital medium by which God communicates with humans, offering divine guidance and comfort, warnings of impending danger, and prophetic glimpses of the future. Muhammed describes several of his own dreams in the Qur'an and in the hadith (the collected sayings of the Prophet). For example, he tells his followers (many of whom were battle-tested warriors) "I saw in a dream that I waved a sword and it broke in the middle, and behold, that symbolized the casualties the believers suffered on the Day [of the battle] of Uhud. Then

I waved the sword again, and it became better than it had ever been before, and behold, that symbolized the Conquest [of Mecca] which Allah brought about" (Hermansen 2001). Muhammed also made a practice of asking his followers to share their dreams so he could interpret them, and he gave them instructions on how to purify themselves so they could have good, heaven-sent dreams (an incubation practice that came to be known as istikhara; see Trimingham 1959; Callois 1966; Hermansen 2001).

Inspired by these teachings from the Qur'an and the hadith, Muslim philosophers and theologians over the centuries developed new techniques and conceptual frameworks for the practice of dream interpretation. The most famous of these interpreters was Ibn Sirin, whose name was reverently attached to dream interpretation manuals long after his death in 728 C.E. Ibn Sirin emphasized that the same dream image could have different meanings for different people, and many of his interpretations hinged on the identification of a special connection between a dream image and a passage from the Qur'an.

The Oneirocriticon of Artemidorus was translated into Arabic in 877 C.E., and it gave further stimulus to Muslim dream theory and practice. During an era of tremendous vitality in Islamic culture, the philosophers Ibn Arabi (1164-1240) and Ibn Khaldun (1332-1402) drew on both Muslim and GraecoRoman dream traditions to devise a basic typology of dreams that has shaped Muslim beliefs to the present day. Here is Ibn Khaldun's rendering of it: "Real dream vision is an awareness on the part of the rational soul in its

spiritual essence, of glimpses of the forms of events.... This happens to the soul [by means of] glimpses through the agency of sleep, whereby it gains the knowledge of future events that it desires and regains the perceptions that belong to it. When this process is weak and indistinct, the soul applies to it allegory and imaginary pictures, in order to gain [the desired knowledge]. Such allegory, then, necessitates interpretation. When, on the other hand, this process is strong, it can dispense with allegory. Then, no interpretation is necessary, because the process is free from imaginary pictures.... One of the greatest hindrances [to this process] is the external senses. God, therefore, created man in such a way that the veil of the senses could be lifted through sleep, which is a natural function of man.

When that veil is lifted, the soul is ready to learn the things it desires to know in the world of Truth. At times, it catches a glimpse of what it seeks.... Clear dream visions are from God. Allegorical dream visions, which call for interpretation, are from the angels. And 'confused dreams' are from Satan, because they are altogether futile, as Satan is the source of futility" (Khaldun 1967).

The dream traditions of Islam have proven remarkably durable, as Muslims today in countries all around the world fully accept that basic typology and continue to look to their dreams for divine reassurance, future guidance, physical and emotional healing, and spiritual initiation (particularly with Sufi mystical practice-see (Ewing 1989). Contemporary Muslims make use of an abundant literature of popular dream interpretation manuals, and they continue to practice dream incubation at shrines of deceased saints (Shaw 1992; Hoffman 1997; Hermansen 2001). Evidence of continued

Muslim belief in the prophetic value of dreams during times of military conflict appears in the videotape publicly released in December of 2001 in which Osama bin Laden and a group of followers discuss dreams that anticipated the September 11 attack on the World Trade Center and the Pentagon.

Hinduism

Hinduism originated in the diverse religious beliefs and practices of the people of the Indus Valley (Persian Hindu, Sanskrit sindhu, "river"), and is now the faith of a majority of the nearly one billion people of modern-day India. The tradition's earliest text is the Rg Veda (ca. 1300 B.C.E.), a

collection of sacred teachings, prayers, and rituals. Dreaming appears in this text as a source of emotional distress and personal danger. For example, a prayer to the god Varuna reads, "If someone I have met, O king, or a friend has spoken of danger to me in a dream to frighten me, or if a thief should waylay us, or a wolf-protect us from that, Varuna." Another prayer involves Agni, the god of fire: "The one who bewitches you with sleep or darkness and lies with you-we will drive him away from here."

A later corpus of sacred texts, the Upanishads (ca 700 B.C.E.), offers a more systematic treatment of dreaming. These texts describe four states of being: waking, dreaming, dreamless sleep, and identity with the Godhead. The Brihad-Aranyaka Upanishad contains this passage on the nature of dreaming: "When one goes to sleep, he takes along the material of this all-containing world, himself tears it apart, himself builds it up, and dreams by his own brightness, by his own light. Then this person becomes self-illuminated. There are no chariots there, no spans, no roads. But he projects from himself chariots, spans, roads. There are no blisses there, no pleasures, no delights. But he projects them from himself blisses, pleasures, delights.... For he is a creator. On this point there are the following verses [from the Vedas]: 'Striking down in sleep what is bodily, sleepless he looks down upon the sleeping [senses]....In the state of sleep going aloft and alow, a god, he makes many forms for himself-now, as it were, enjoying pleasures with women, now, as it were, laughing, and even beholding fearful sights."

Historian of religions Wendy Doniger has pointed out the significance of the terms used in these texts: "The verb srj, used to express projection, means literally to 'emit' (as semen, or words), and it frequently occurs in stories about the process of creation (sarga, from srj) in which the Creator emits the entire universe from himself the way a spider emits a web" (O'Flaherty 1984). Furthermore, "the same verb is used here and throughout Indian literature to denote one's perception of both worlds: one 'sees' (drs) the world just as one 'sees' a dream."

Further evidence for Hindu interest in dreams can be found in the following texts: the two great epics The Mahabharata (ca. 400 B.C.E.-400 C.E.) and The Ramayana (ca. 100 B.C.E.), in which dreams play dramatic roles in portending future disasters, revealing strong emotions, and offering alluring glimpses of truth that the dreamers both desire and fear (Bulkeley 1999b); medical texts like the Athara Veda (ca 500-600 C.E.), which gives an

extensive catalog of different types of dreams, their meanings, their origins, and their relevance to the psychosomatic conditions of the dreamer; and philosophical texts like the Yogavasistha (900-1200 C.E.), which tells several stories about dreams and dreamers, stories that have the cumulative effect of disrupting ordinary distinctions between waking and dreaming, calling into question one's basic sense of existential identity. Running through all these texts is an underlying belief in the pluralism of dreaming: some dreams are primarily influenced by bodily conditions, others by personal temperment, and still others by gods and goddesses.

"These two ideas-that dreams reflect reality and that they bring about reality-remain closely intertwined in Indian texts on the interpretation of dreams" (O'Flaherty 1984).

Buddhism

This tradition emerged in 5th-6th B.C.E. India, and its beginning is attributed to the decision of a prince named Guatama to renounce his privileged life and meditating under a Bo tree, which led him to become a Buddha, literally "one who has awakened" to the truth (Bowker 1997). Buddhist interest in dreaming starts with Guatama's conception. His mother, Queen Maya, is said to have had a dream by which she was impregnated with a child who destined to become either a universal king or, if he renounced the world, a Buddha. Here is one version of Queen Maya's dream: "At that time the Midsummer festival (Asalaha) was proclaimed in the city of Kapilasvatthu....During the seven days before the full moon Mahamaya had taken part in the festivities....On the seventh day she rose early, bathed in scented water, and distributed alms....Wearing splendid clothes and eating pure food, she performed the vows of holy day. Then she entered her bed chamber, fell asleep and saw the following dream: The four guardians of the world lifted her on her couch and carried her to the Himilaya mountains and placed her under a great sala tree....Then their queens bathed her....dressed her in heavenly garments, anointed her with perfumes and put garlands of heavenly flowers on her....They laid her on a heavenly couch, with its head towards the east. The Boddhisattva, wandering as a superb white elephant....approached her from the north. Holding a white lotus flower in his trunk, he circumambulated her three times. Then he gently struck her right side, and entered her womb" (Young 2001). This story, which dramatically

expands on the earlier Hindu theme of the cosmic creative power of dreaming, has been included in nearly every biographical text on the Buddha, and it has frequently been reproduced in painting, sculpture, and other forms of iconography. One of its noteworthy features is its ritual context, which reflects an idealized version of dream incubation. Indeed, there is abundant evidence throughout Buddhism's history of practices devoted to dream incubation, practices that in various ways model themselves on what Queen Maya did in terms of purifications, prayers, devotional activities, astronomical timing, and special sleeping conditions (Laufer 1931; Wayman 1967; O'Flaherty 1984; Ong 1985; Young 1999, 2001).

In keeping with the popular practice of dream incubation, several Buddhist medical texts were written to explain the origins and meanings of different kinds of dreams. Regarding origins, Buddhist explanations included disturbances of bodily humors, reflections of daily experience, personal fantasies, future prophecies, divine influences, strong emotions, sexual desire, and demonic attack (Wayman 1967; O'Flaherty 1984; Ong 1985; Young 1999). Other prominent texts spoke of dreams as a means by which Buddhist monks managed to convert Indian Kings to their faith. "Doubtless, these stories [of monks interpreting kings' dreams] reflect actual Buddhist practice, for other sources corroborate the tradition that Buddhists converted many Indian Kings by a combination of public debate, private counseling,...and a kind of primitive psychoanalysis" (O'Flaherty 1984).

Buddhist monks, in the context of seeking to understand the illusory nature of all reality, took special interest in developing the ability to maintain awareness and intentionality within the dream state (Gillespie 1988; Norbu 1992; Rinpoche 1998; Young 1999). For example, the Tantric Buddhist Naropa (11th century C.E.) (who left his home as a youth to seek out a teacher whose name he had been given in a dream), taught his followers a precise method for cultivating awareness in dreaming, including special visualizations, breathing exercises, and sleep postures (Gillespie 1988). In recent years these Buddhist dream practices have become the subject of interest to Western researchers in "lucid dreaming," who have sought parallels between the conscious dream experiences of Buddhist monks and contemporary Westerners (LaBerge 1985; LaBerge 1988). Their efforts have been met with the response that Buddhist dream experiences cannot be adequately understood outside the religious context in which they were

generated (Norbu 1992; Lama 1997; Rinpoche 1998; Young 1999; Doniger 2001).

Comparative Analysis

In the interest of space, although at the risk of slighting many other rich dream traditions, I will bring this survey to a close with the observation that historians of religion, anthropologists, and ethnographers have found a tremendous variety of sophisticated dream beliefs and ritual practices in the indigenous cultures of North America (Benedict 1922; Morgan 1932; Luomala 1936; Radin 1936; Eggan 1952; Eggan 1955; Eggan 1957; Wallace 1958; Hallowell 1966; Devereux 1969; Irwin 1994; Irwin 2001), Central and South America (Gregor 1981; Gregor 1983; Tedlock 1987; Descola 1993; Gregor 2001; Kracke 2001; Tedlock 2001), Africa (Sundkuler 1961; Fabian 1966; Charsley 1973; Levine 1975; Curley 1983; Charsley 1987; Shaw 1992; Shafton 2002), and Oceania (Firth 1934; Sharp 1969; Tonkinson 1970; Stephen 1979; Trompf 1990; Stephen 1995; Bosnak 1996; Lohmann 2001). Although I do not have room in this chapter to give even a brief review of all this material, I will in the following comparative analysis take the beliefs and practices of these cultural traditions into consideration as I highlight a set of cross-cultural themes and patterns.

Quality of the Data

Before going further, a key question needs to be addressed: how are we to assess the quality of this data? There are at least two reasons to adopt a cautious attitude toward the historical and cross-cultural material just reviewed. First, nearly all of the texts we have considered so far have been shaped to varying degrees by the interests of scribes, editors, redactors, compilers, and translators. These intermediaries have determined which dreams are and are not recorded, which details are and are not included, which meanings are and are not emphasized. As a result, our access to the dream beliefs, practices, and experiences of people from other places and times is never direct, but always mediated by people who have strong personal and ideological motives to present dreams in certain ways and not in others. Second, even in cases where we have a relatively direct report of a person's dream experience, we must still consider the possibility that the individual has revised or embellished his or her experience, whether through

conscious fabrication or unconscious subterfuge. Put most crudely, we can never be sure whether or not people are actually telling the truth when they report a dream-they may just be making it all up. These two factors make it difficult if not impossible to support general claims about dreaming based on historical and cross-cultural evidence alone.

However, even if it is not decisive by itself, the historical and cross-cultural evidence becomes surprisingly significant when considered in the light of contemporary neuroscientific research on the dreaming brain. Providing that kind of illumination is my ultimate goal in this chapter.

Major Cross-Cultural Themes. Let us summarize and conceptually organize the material covered so far. Here is what we can most confidently propose, independently of any experimental research and relying solely on the history of religions data, about people's basic beliefs, practices, and experiences involving dreams and dreaming:

1. Widespread Public Interest. Although surviving dream reports from ancient times generally come from the social elite (kings, priests, military leaders), there is ample evidence of strong popular interest in dreams among all segments of society in virtually every known culture.

2. Different Types of Dreams. All cultures make distinctions among different types of dreams, with the most common distinction being between significant and insignificant dreams.

3. Qualities of Dreaming. Many cultures emphasize the visual nature of dreaming and speak of "seeing" dreams, and dreams as a type of "vision." Nearly all cultures emphasize the strong emotional qualities of dreaming, i.e. the way dreams bring forth deep passions and powerful desires.

4. Origins of Dreaming. Although each culture has its own distinct understanding of the origins of dreaming, nearly all of them revolve around the paradox that dreaming is both passive and active, something people receive and create, something coming from outside and inside at the same time.

5. Functions of Dreaming. In keeping with the belief in different types of dreams, all cultures believe dreaming serves several different functions, among which the most important are anticipating the future, warning of danger, envisioning sexual pleasure, heralding new births, mourning death and other losses, healing illness, giving moral guidance, and providing divine reassurance in times of distress. In rare but widely reported cases, dreams are

seen as serving the additional function of sparking religious conversions, i.e., provoking radical transformations of personality and/or spiritual orientation.

6. Dream Content. Remaining mindful of the limited confidence we can have in the veracity of subjective dream reports, we can identify the following as the most prominent elements of dream content cross-culturally: Characters personally known to the dreamer; characters with supernatural or divine qualities; animals, especially snakes; sexual activity; flying and falling; fighting, conflict, and aggression; bodily functioning (e.g., eating, excreting, illness, teeth).

7. Dream Interpretation. In every known culture there are people who have devoted extensive amounts of time and attention to the practice of dream interpretation. Most interpreters use a combination of personal details, common cultural symbols and metaphors, and linguistic analysis (e.g., wordplay, punning, parallels and oppositions). These interpretive practices are almost always accompanied by an awareness of the potential to be deceived or misled by dreams.

8. Dream Rituals. Dream rituals are found all over the world, with the basic aims of fending off bad dreams and evoking good ones. The most prominent of these rituals are those intending to "incubate" a good dream by means of purifications, devotions, prayers, sleeping at a special time and in a special place (e.g., a temple, cave, mountain top, shrine, grave), and using a special body position or posture.

Mark Solms and the Neuropsychology of Dreams

Hobson's Activation-Synthesis model, with its emphasis on the unidirectional, bottom-up influence of brainstem processes on dream formation, has been challenged by Mark Solms, a psychoanalytically-trained clinical neurologist at London Hospital Medical College who has carefully studied the dreams of 361 patients suffering a variety of brain lesions (Solms 1997). Solms found that almost all of the patients suffered one of four distinct "syndromes" or patterns of disrupted dreaming: "global anoneira," a total loss of dreaming; "visual anoneira," cessation or restriction of visual dream imagery; "anoneirgnosis," increased frequency and vivacity of dreaming, with confusion between dreaming and reality; and "recurring nightmares," an increase in the frequency and intensity of emotionally disturbing dreams. Solms analyzed these four syndromes in comparison to each other and in

comparison to those patients (N=24) who, despite suffering serious forms of brain damage, experienced no disruptions in their dreaming. On this basis, Solms has made several claims about what specific regions of the brain are responsible for the formation of dreams:

1. Both Hemispheres. Solms says that global anoneira "can occur with strictly unilateral lesions in either hemisphere," suggesting that both left and right hemispheres make necessary contributions to normal dreaming. This refutes arguments that the right hemisphere has exclusive control over dreaming, and Solms says his findings support Doricchi and Violani's theory that both hemispheres play functional roles, with the right hemisphere providing the "perceptual 'hard grain'...which is probably indispensable for the sensorial vividness of the dream experience" and the left hemisphere providing the "cognitive decoding of the dream during its actual nocturnal development."

2. Global cessation of dreaming can occur after damage to several different regions of the brain, which Solms says supports a distributed, non-modular view of brain-mind functioning: "[C]omplex mental faculties such as reading and writing (and, we might add, dreaming) are not localized within circumscribed cortical centers....[They] are subserved by complex functional systems or networks, which consist of constellations of cortical and subcortical structures working together in a concerted fashion."

3. Solms finds that language disorders such as aphasia were no more common among his dreaming patients than his non-dreaming patients, and he comments "the high incidence of preserved dreaming among our aphasic patients....demonstrates that loss of the ability to generate language does not necessarily imply loss of the ability to generate dreams." Solms does, however, acknowledge that deeper semantic disorders related to language may be crucial to normal dreaming.

4. Solms finds a "double dissociation" between visual imagery in dreams and visual perception in waking: patients with visual problems had normal dreaming, and patients with nonvisual dreaming had normal visual abilities. Specifically, he finds that brain areas V1 and V2, which are crucial for the processing of external visual signals, are not necessary for the generation and maintenance of normal dream imagery. This means, Solms says, that "dream perceptions are not perceptions; they are representations of perceptions" and he claims his findings refute theories that explain dreams as "internally

generated images which are fed back into the cortex as if they were coming from the outside."

Taking these points together, Solms proposes a model of the normal dream process in which several particular brain regions make functional contributions: basal forebrain pathways, which contribute "a factor of appetitive interest" in terms of curiosity, exploration, and expectation; the medial occipito-temporal structures, which contribute visual representability; the inferior parietal region, which contributes spatial cognition; the frontal-limbic region, which adds "a factor of mental selectivity" in separating dreaming from waking (damage to this region leads to reality-monitoring problems in waking); and temporal-limbic structures, which contribute "a factor of affective arousal" and may, in their seizure-like behavior during sleep, be the ultimate source of dream generation. Solms claims his neuropsychological findings refute Hobson's Activation-Sythesis theory: "[T]he neural mechanisms that produce REM are neither necessary nor sufficient for the conscious experience of dreaming....[N]ormal dreaming is impossible without the active contribution of some of the highest regulatory and inhibitory mechanisms of the mind. These conclusions cast doubt on the prevalent notion-based on simple generalizations from the mechanism of REM sleep-that 'the primary motivating force for dreaming is not psychological but physiological' (Hobson and McCarley 1977). If psychological forces are equated with higher cortical functions, it is difficult to reconcile the notion that dreams are random physiological events generated by primitive brainstem mechanisms, with our observation that global anoneira is associated not with brainstem lesions resulting in basic arousal disorders, but rather with parietal and frontal lesions resulting in spatial-symbolic and motivationalinhibitory disorders. These observations suggest that dreams are both generated and represented by some of the highest mental mechanisms."

Unfortunately, the alternative offered by Solms to replace Activation-Synthesis turns out to be a pale restatement Freud's sleep-protection theory (Freud 1965). Solms, unlike Freud, takes no interest whatsoever in the study of dream content (Solms 1997). However, he fully endorses Freud's sleep-protection model of dream formation, and the ultimate, though modestly stated, intention of Solm's 1997 book is to promote a neuropsychological revival of psychoanalytic theorizing.

In considering Hobson's work above, I suggested we distinguish his anti-psychoanalytic polemics from his research findings. Here I suggest we make a similar distinction between Solms' propsychoanalytic theorizing and his clinico-anatomical data. From the perspective of our interest in the study of big dreams, one immediate point of interest in Solms' work is the syndrome of "excessive dreaming," or anoneirognosis. This syndrome involves people experiencing intensely emotional and hyperrealistic dreams, often with unusual characters and other content features (although Solms takes no interest in content, his clinical descriptions of the ten patients who had this syndrome include dream reports of meeting deceased loved ones, visiting the "pearly gates," visiting a very beautiful place, and having a black snake crawl into the dreamer's vagina. Both in form and content, these anoneirognostic dreams are quite similar to historical and cross-cultural reports of big dreams. Although Solms' patients would probably be happy to give up their hyper-vivid dreams if they could just regain normal brain/mind functioning again, the experiential similarities of their dreams to the types of dreams most frequently reported in the world's religions is highly suggestive. If Solms is right that frontal limbic lesions are the cause of this syndrome, this may be a key region of the brain to study in connection with the religiously-oriented experience of big dreams.

Also of interest is Solms' account of the syndrome of recurrent nightmares. Patients who have damage to the brain's temporal-limbic areas are especially prone to an increase in nightmares, Solms says, because that particular kind of damage often produces intense neural discharges and seizure activities that overwhelm the ordinary functioning of the brain and inject the patients' dreams with a relentless sense of anxiety. Solms speculates that seizure activity anywhere in the brain can set the dreaming process in motion. This suggests that a potentially fruitful way to study big dreams, some of which are terribly frightening and nightmarish, is to investigate their connection to states of heightened temporal-limbic activation, such as occurs in epilepsy and perhaps other kinds of religious experience. Many common features of big dreams-e.g., the number and frequency of emotions, the activation of instinctive behavior patterns like fight-or-flight, the strong physiological arousal upon awakening-may well be attributable to the extraordinary activation of certain neural processes in the temporal-limbic regions of the brain.

Other Contributions from the Cognitive Sciences

The comparative analysis I offer in the final section of this chapter will be guided primarily by the findings of Hobson and Solms. However, it will also draw deeply on the work of several other researchers whose findings have tremendous potential for the study of big dreams. These include

Tracey Kahan (Kahan 2000; Kahan 2001), Jayne Gackenbach (Gackenbach 1991), and Stephen LaBerge (LaBerge 1985), who have explored the phenomenon of lucidity, consciousness, and metacognition in dreaming; David Foulkes (Foulkes 1999), who has shown that the development of a capacity for dreaming tracks the development of general cognitive abilities; G. William Domhoff (Domhoff 1996; Domhoff 2001; Domhoff 2001), who has identified fundamental elements in the content of ordinary dreams and thereby provided a valuable comparative context for the investigation of extraordinary dreams; Ernest Hartmann (Hartmann 1995; Hartmann 1998), who has accounted for the therapeutic value of dreams by highlighting the neural connections that are formed and reformed during the dreaming process; and Antti Revonsuo (Revonsuo 2000), whose "threat simulation" model of the nature and function of nightmares provides important insight into the possible evolutionary emergence of big dreams as authentic contributors to human survival and reproductive success.

Comparative Analysis: Cross-Cultural Themes Revisited

In this section I will integrate the foregoing material from the history of religions and cognitive neuroscience. I will identify points of agreement and disagreement between the two bodies of research, raise questions that I hope will be tested in future investigations, and outline a new model of the formation, function, and meaning of big dreams.

1. Widespread Public Interest. The discovery of the physiological universality of REM sleep among mammals and its formative role in human brain development certainly accords well with the cultural universality of interest in dreaming. The numerous reports of dream experiences from cultures all over the world and throughout history are just what one would expect if dreaming fundamentally depends on a biologically innate process like REM sleep. However, the close relationshipin many cultures between dreams, visions, trances, artistic inspirations, and other extraordinary modes

of consciousness suggests that at least some features of dream formation do not depend on REM sleep but can be activated in a variety of other mind/brain conditions. This is certainly the point made by Solms' research. I believe dreaming is best understood as an evolutionary "spandrel" (Flanagan 2000), i.e. a process that was not directly selected for in evolution but has emerged out of other processes that were directly selected for in the pre-history of our species. The psychological experience of dreaming seems to be a spandrel to REM sleep, an evolutionary by-product that has, over time, developed its own functional capacities. Question 1: Are there any significant differences between the brain/mind systems of healthy people with high rates of dream recall and healthy people with little or no dream recall? Question 2: Do the brain/mind systems of healthy people with high rates of dream recall have functional advantages in terms of conceptual flexibility, imaginative creativity, and emotional balance?

2. Different Types of Dreams. Because of the lab effect, contemporary neuroscientists are in a poor position to say much about the more infrequent and unusual types of human dream experience reported by the world's religious traditions. However, Hobson, Solms, and other neuroscientists have acknowledged that some dreams do possess an extraordinary emotional power and perceptual vividness. This reveals a crucial point of agreement between the world's religions and contemporaryneuroscience: both recognize that most dreams are fairly mundane and unremarkable, while a rare few are strikingly vivid and intense. The future study of big dreams will go far indeed if it takes its point of departure from this fundamental unity of belief about the existence of distinct types of dream experience. We can expect that new advances in the technology that monitors sleep stages in home environments will enable researchers to make major advances in our understanding of the neural correlates of unusual types of dream experience. Question 3: Do different types of dreams involve different modes of neuropsychological activity? Question 4: What are the neuropsychological distinctions between big dreams and ordinary dreams?

3. Qualities of Dreaming. There is complete agreement on this point between neuroscience and the world's religions. Both speak of dream experience as primarily visual in nature, and both emphasize the strong emotional content in many dreams. Neuroscience is not yet clear on how exactly visual perception occurs in dreaming, but it may well be connected to

the activation of brain systems involved in motor behavior and spatial orientation. People move around a lot in their dreams, and they often find themselves in strange places and new situations (Hobson 1999). The simultaneous activation of visual, motor, and orientational systems accounts for the experiential richness of the dreaming "life-world," and this suggests that the common contemporary analogy between dreaming and watching a movie is misleading. Dreaming is not like passively viewing images on a screen; dreaming is more like being suddenly thrown into a place you've never seen before and having to figure out where you are. Additional evidence for this view comes from cross-cultural reports of big dreams involving journeys of the soul to otherworldly realms. Question 5: What parts of the brain are activated in dreams with unusually creative and aesthetically complex visual imagery? Question 6:

Are there any types of big dream that do not involve heightened activity in the limbic region (especially the amygdala) and other areas responsible for emotional responsiveness?

4. Origins of Dreaming. Neuroscience and the world's religions agree that the majority of dreams are related to the common concerns of daily life, themes such as bodily health, family relations, social status, etc. Neuroscience and the world's religions fundamentally disagree, however, on the question of big dreams, which most religious traditions believe are caused by something outside the dreamer's personal self, i.e., by transpersonal sources of power, agency, and intention. This disagreement marks a profound philosophical divide, and I do not believe it can be easily bridged. I do, however, believe neuroscience can grant at least the metaphorical truth of the religious view. If "self" is understood as "cognitive sphere of ordinary waking life identity," then it is both meaningful and experientially true to speak of certain dreams as originating from someplace outside of the self. I also believe that new answers to the apparent intentionality of big dreams will come from the study of dreaming as a phenomenon of chaos in which complex, unpredictable patterns of neural activity generate a highly dynamic, self-organizing, self-creating experiential process (Hobson 1993; Kahn 2000). Question 7: Can patterns of meaning, intention, and teleology be identified in a person's dreams across his or her lifetime? Question 8: Do big dreams involve a greater degree of chaotic brain activation than occurs in ordinary dreaming?

5. Functions of Dreaming. There is mixed agreement on this. Contemporary research has produced findings that generally support cross-cultural beliefs that dreams function to anticipate the future, prepare for possible threats, envision sexual pleasure, herald new births, mourn death and other losses, and promote healing. The additional cross-cultural beliefs about moral guidance, divine reassurance, and conversion in dreams do not find much support from neuroscience. However, I will wager that future research will show that these "religious" functions can be understood as plausible extensions of other well-established brain/mind processes. Question 9: Do people with culturallyreinforced expectations about the moral and religious value of dreaming have significantly different brain activities during sleep than people without such expectations? Question 10: Do big dreams prompting conversion experiences involve any special activity in those regions of the brain responsible for maintaining a coherent and consistent sense of self?

6. Dream Content. As noted above, Solms and other neuroscientists take little interest in dream content. But scientifically reliable tools for studying dream content do exist, with the most sophisticated such system being the content analysis method founded by Calvin Hall and Robert Van de Castle (Hall & Van de Castle 1966) and recently revised and expanded by G. William Domhoff (Domhoff 1996). Looking at the content analysis findings on common elements in human dreaming, we find close correspondence with the content of the dreams reported from historical and cross-cultural contexts. The same basic themes can be seen in content analysis and the history of religions: birth, death, social relations, bodily functioning, sexuality, fighting, flying, and encounters with animals, especially snakes (for an exemplary synthesis of the biological, neurological, psychological, and cross-cultural data on snake dreams, see Wilson 1998). In the world's religions we find a higher percentage of dreams with supernatural beings in them, which suggests that unusual, and unusually powerful, characters are one of the key features that distinguish big dreams from ordinary dreams. Question 11: What other content elements are more frequent in big dreams than in ordinary dreams? Question 12: Can a content profile be developed for different types of big dreams that would allow an investigator other than the dreamer to look at a dream series and identify those reports most likely to be described by the dreamer as "big dreams"?

7. Dream Interpretation. If neuroscientists take little interest in dream content, they take none in interpretation-"Interpretation is always a risky, speculative enterprise" (Hobson 1999). This skepticism accords well with the repeated warnings found in the world's religions about the possibility of being deceived, misled, and deluded by dreams. Most religious traditions acknowledge this danger, and then go ahead and try to interpret their dreams by using a core set of methods: seeking associations to the dreamer's personal life, identifying connections with common cultural symbols and metaphors, and making a linguistic analysis of wordplay, punning, parallels, and oppositions. These methods are essentially identical to those used by most contemporary psychotherapists, and one good theoretical framework in which to understand this connection between religious and psychological practice is to look at dreaming as a special mode of metaphorical thinking (Lakoff 2001). The prevalence of metaphor in dreams attests to the crucial role of association cortex in dream formation, which in turn highlights the fact that dreaming involves a dynamic interaction between "higher" and "lower" brain systems. It appears that highly memorable and impactful dreams are generated by the spiraling feedback of unusually intense neural discharges from the brainstem with unusually creative metaphorical thinking in the forebrain. Question 13: Are the brain processes involved in dream metaphor the same as the brain processes used to generate metaphorical thinking while awake? Question 14: Does the interpretation of big dreams require the use of special methods different from those used in the interpretation of ordinary dreams?

8. Dream Rituals. The lab effect clearly demonstrates the strong influence of pre-sleep stimuli on dreaming. Indeed, the sleep laboratory may one of the best tools ever devised for achieving a major goal of cross-cultural dream incubation: fending off bad dreams. As Ernest Hartmann notes, when frequent nightmare sufferers come to the sleep lab they have far fewer disturbing dreams because they go to sleep with the reassuring awareness that lab technicians will be carefully watching over them all night long (Hartmann 1984). Cross-cultural rituals of dream incubation can be understood as deliberate efforts to utilize special pre-sleep stimuli as means of generating particular types of dreams. The cross-cultural reports suggest the rituals frequently have the desired effect: Asklepian supplicants receive healing dreams, Native American initiates have dreams of guardian spirits, Buddhist

yogins have lucid dreams. Of course, many of these reports include some degree of post-dream editing and revising, but it would be unwise to dismiss all such dreams as deliberately fabricated "culture pattern" dreams. In light of the lab effect, and in consideration of the scientific literature on the incorporation of pre-sleep stimuli in dreaming (Van de Castle 1994), it makes good sense that the basic methods of dream incubation (focusing attention, physical purification, sleeping in an unusual setting), if practiced consistently and with a strong belief in their efficacy, would produce discernible effects on people's actual dreaming experience. I suggest that dream incubation rituals represent the earliest experimental investigations of dreaming, and for that reason they deserve serious attention from contemporary researchers. Question 15: Do dream incubation rituals increase the involvement in dreaming of the forebrain, particularly the neural systems responsible for executive command functions? Question 16: Do people raised in cultural traditions with high interest in dreaming have significantly different neuropsychological patterns in their dreams as compared to people raised in cultural traditions with little or no interest in dreaming?

The Formation, Function, and Interpretation of Big Dreams

Efforts to study big dreams face a number of methodological difficulties, with no simple or obvious way to overcome them. Every source of data we possess, up to and including modern sleep laboratory research, is compromised by various limits and imperfections. Researchers who want to learn more about big dreams are thus driven by methodological necessity to develop interdisciplinary frameworks for understanding the formation, function, and interpretation of highly memorable, deeply impactful dreams. The human sciences (religious studies, anthropology, philosophy, history, lingustics, psychology) have much to contribute to the development of these frameworks, and so do the natural sciences (molecular biology, cognitive neuroscience, evolutionary theory, nonlinear dynamics). Future advances in the study of big dreams, and in the field of neurotheology generally, will depend on the interdisciplinary creativity of scholars who try weaving together all these multiple threads of insight and understanding.

I take the following words from neuroscientist Antonio Damasio as a good expression of the spirit animating my own interdisciplinary research: "the power of science comes from its ability to verify objectively the

consistency of many individual subjectivities" (Damasio 1999). This chapter has been devoted to showing how a new synthesis of religion and neuroscience can provide scientific verification for the extraordinary dream experiences of "many individual subjectivities." To close the chapter I want to summarize my rendering of a religion-neuroscience synthesis and offer a new framework for understanding the formation, function, and interpretation of big dreams.

Formation

Big dreams emerge from brain/mind processes that are intimately related to, but not strictly dependent on, the neural activities of REM sleep. Big dreams involve extraordinarily energetic feed-back loops between higher and lower regions of the brain/mind system, which points to the likelihood that big dreams are shaped by the same kinds of nonlinear dynamics and self-organizing tendencies that researchers have identified in other chaotic systems (e.g., the weather, natural ecologies, water currents, star formation). Although much more research is needed on this point, current neuroscientific findings suggest that several different brain regions contribute to the formation of big dreams, especially the brainstem (responsible for generating PGO waves), the frontal-limbic area (responsible for reality-monitoring), the temporal-limbic area (responsible for emotional arousal), and the prefrontal cortex (responsible for narrative coherence and focused attention). The ultimate generative source of a big dream is usually felt by the dreamer to lie far outside his or her ordinary waking self. This is where the world's religious traditions come in, offering explanations that refer to the soul of the dreamer and/or the influence of transpersonal beings and powers.

Function

Strong evidence from both religious history and neuroscience shows that big dreams can serve a variety of functions: anticipating the future, warning of danger, envisioning sexual pleasure, heralding new birth, mourning death and other losses, and healing illness. Each of these functions can be understood in evolutionary terms as contributing to the adaptive fitness and reproductive success of Homo sapiens sapiens. These functions can also be understood in religious terms as the means by which Divine beings and powers interact with humans, benevolently guiding people through their

lives. The religions of the world have also believed big dreams serve other functions: providing moral guidance, offering Divine reassurance, and sparking deep personality transformation (conversion). Neuroscience has yet to examine these more specifically religious functions in any detail, but it seems reasonable to view them as further extensions of what neuroscience already knows, i.e. that dreaming generates a tremendous degree of creative power that is directly involved in promoting, preserving, and sustaining the individual's healthy brain/mind functioning. To put my theory in a phrase, dreaming provokes greater consciousness. Dreaming literally calls forth new voices and new possibilities into the dreamer's conscious awareness. Especially in the experience of big dreams, I believe the supreme function is to stimulate the dreamer to grow in consciousness-to consider new thoughts, acknowledge new feelings, remember past experiences, and take new actions in waking life. By provoking greater consciousness, big dreams fundamentally reorient people's views of themselves and the world, and this deep reorientation inevitably extends to their relationship to ultimate reality, however they personally and culturally conceive it.

Interpretation

At a certain level it is impossible to give a satisfying interpretation of a big dream, because they almost always involve images, feelings, and sensations that defy translation into waking language. Nevertheless, people throughout history have tried to interpret their dreams, and the most frequently used methods are seeking associations to the dreamer's personal life, identifying connections with common cultural symbols and metaphors, and making a linguistic analysis of wordplay, punning, parallels, and oppositions (all the while remaining vigilant toward possible deception). In my own research

I have found several specific interpretive techniques that are effective in the study of big dreams-for example, focusing special attention on especially bizarre elements, or on sudden shifts in scene or character (Bulkeley 2000). Big dreams may be more amenable than ordinary dreams to creative expression by means of drawing, painting, poetry, theater, music, and other artistic media, and these endeavors should also be regarded as legitimate modes of interpretive exploration.

Conclusion

A growing number of scholars have taken up the interdisciplinary challenge of studying big dreams, and I strongly suggest that researchers in the budding field of neurotheology consult their works. A strong case can be made that dreaming is the most universal form of religious experience and spiritual transformation to be found in human history. The world's religious traditions have long testified to this fact, and we now have the neuroscientific means to verify it. By drawing together these two realms of understanding we not only deepen our knowledge of a truly amazing phenomenon of human existence-we also gain the ability to enhance its power in the world.

10. Possession and Prophecy
by R. Joseph

PRESENCE, POSSESSION & THE ALIEN HAND

"After getting into bed I had a vivid tactile hallucination of being grasped by the arm, which made me get up and search my room for an intruder. The next night I suddenly felt something come into the room and stay close to my bed. It remained only a minute or two. There was a horribly unpleasant sensation connected with it. It stirred something at the roots of my being. The feeling was not pain so much as abhorrence. Something was present with me, and I knew its presence far more surely than I have ever known the presence of any fleshly living creature. I was conscious of its departure as of its coming; an almost instantaneously swift going through the door, and the horrible sensation disappeared" (James, 1902).

"Quite early in the night I was awakened. I felt as if I had been aroused intentionally, and at first thought someone was breaking into the house. I immediately felt a consciousness of a presence in the room, it was not a consciousness of a live person, but of a spiritual presence. I also at the same time felt a strong feeling of superstitious dread, as if something strange and fearful were about to happen" (James, 1902).

It is certainly possible, in some cases, that the experience of a "presence," of the existence of an unseen person or entity, may have a supernatural origin. Neurologically, however, this condition is associated with abnormalities, including seizure activity, involving the right hemisphere--the right parietal lobe in particular—and disturbances involving the corpus callosum interconnections between the right and left (speaking) half of the brain including the medial frontal lobe and anterior commissure (Joseph, 1988a,b, 1996, 1999a).

For example, a woman with a right parietal injury repeatedly claimed that at night another person would get into bed with her. She believed that the alien entity was a little Negro girl, whose arm would slip into the patient's sleeve (Gerstmann, 1942). This alien "presence" was exclusively a left sided phenomenon. Yet another patient with a right parietal injury claimed "that an

old man" would get into bed with him. Another patient engaged in peculiar erotic behavior with his left limbs which he believed belonged to a woman. A patient described by Bisiach and Berti (1987, p. 185) "would become perplexed and silent whenever the conversation touched upon the left half of his body; even attempts to evoke memories of it were unsuccessful." Instead he claimed "that a woman was lying on his left side; he would utter witty remarks about this and sometimes caress his left arm".

Some patients feel as if the left half of their body has been taken over by something evil that is persecuting them. They may develop a dislike for their left arms or legs, try to throw them away, become agitated when they are referred to, entertain persecutory delusions regarding them, and repeatedly complain of strangers sleeping in their beds.

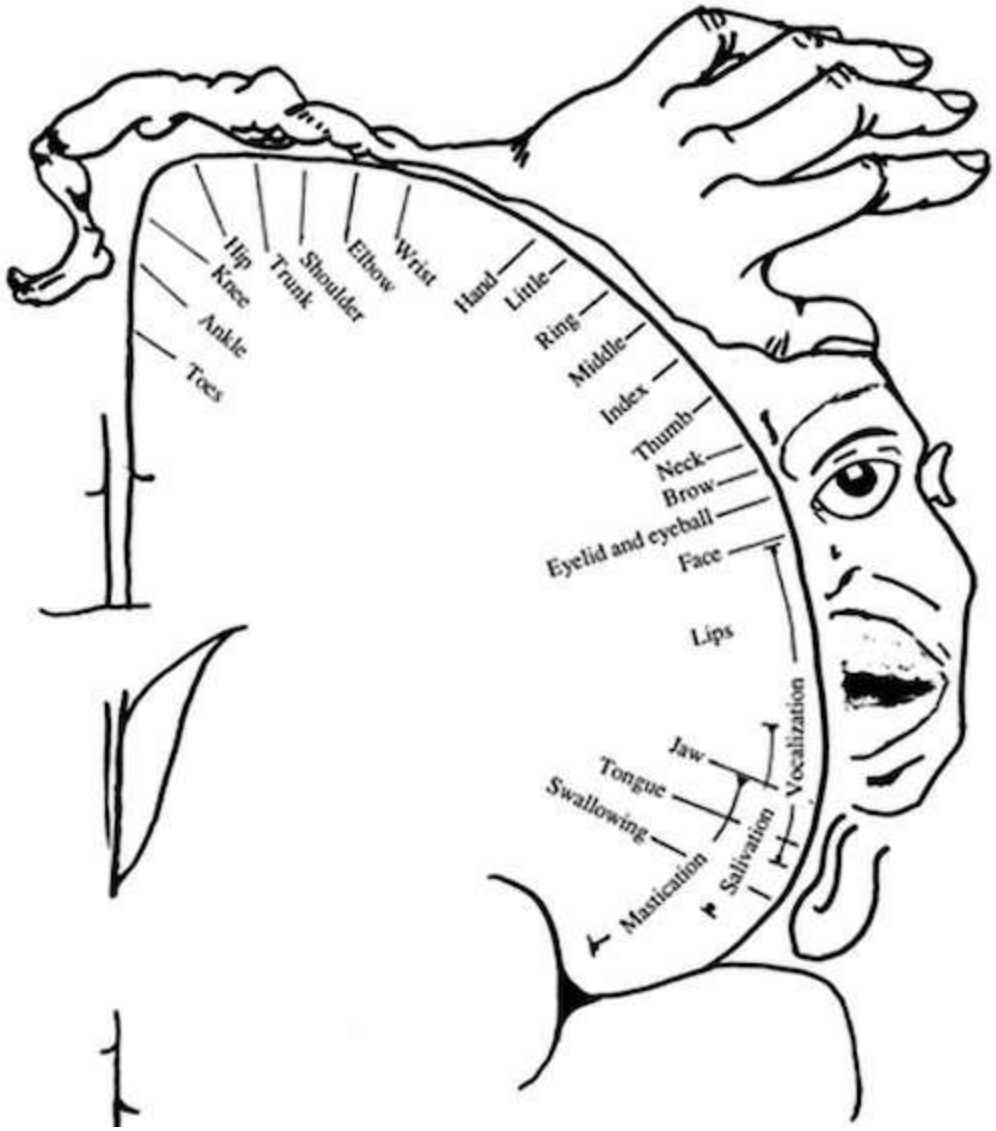


FIGURE: The left half of the body is represented in the right hemisphere and the right half of the bodyt in the left hemisphere

One patient complained that this other person tried to push her out of the bed. She threatened to sue the hospital. Another patient, after bumping into her left arm and leg all night, bitterly complained about "a hospital that makes people sleep together." She expressed not only anger but concern least her husband should find out; she was convinced it was a man in her bed.

Likewise, the left hemisphere of some split-brain patients have claimed to hate the left half of their body and attribute to it disagreeable personality traits or claim that it has engaged in behavior which the speaking half of the brain finds unpleasant, strange, objectionable, embarrassing, or contrary to

it's wishes (Joseph, 1988ab).

In many instances, patients may have lived a normal, uneventful life, only to suddenly become possessed by an alien presence which takes over half their body.

Goldberg (1987, p 290) describes a 53 year old right-handed women, "B.D." who while at work was overcome with a "feeling of nausea and began to notice that her left leg felt 'as if it did not belong to me.' This feeling of being dissociated from her body spread to the rest of her left side. At home, her symptoms began to worsen. While sleeping one night a few days after admission to the hospital, she woke up suddenly and noticed her own left hand scratching her shoulder.... She would frequently look down to find the hand doing something that she had no idea it had been doing. She found this very disturbing and was convinced that she was going crazy." Subsequent CT scan and MRI indicated an infarct to the medial frontal lobe and damage to the body of the corpus callosum.

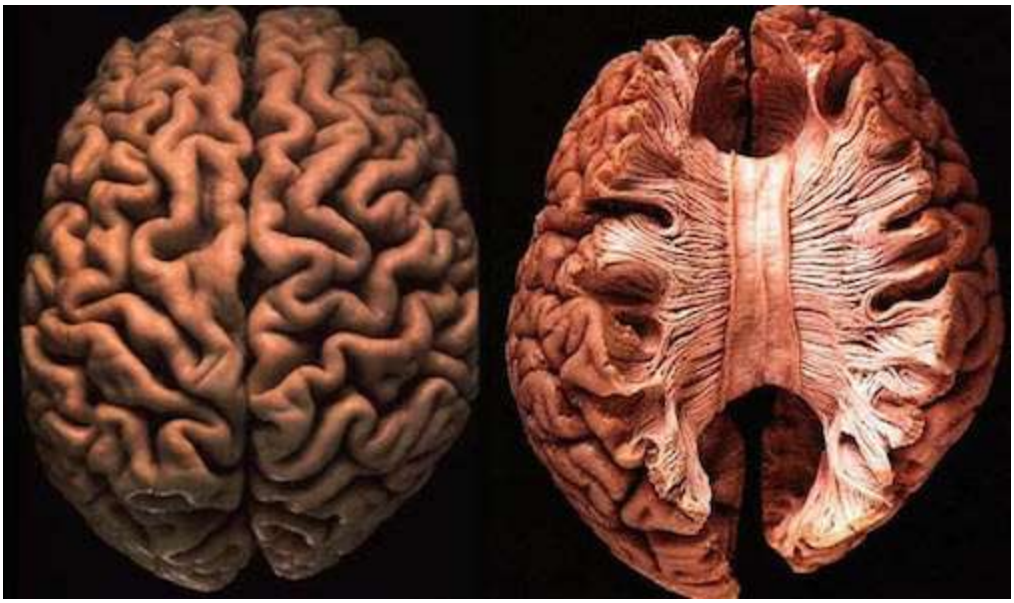
Another patient described by Goldberg (1987, p. 295) reported "an incident in which she was lying in bed with the window open when suddenly the left limb reached down and pulled up the covers, functioning entirely in the alien mode. She concluded that 'it' must have felt cold and needed to cover her up. She felt that frequently the 'alien' did things that were generally 'good for her.'" McNabb, Caroll, and Mastaglia (1988, pp. 219, 221) describe a woman with extensive damage involving the medial left frontal lobe and anterior corpus callosum, whose right "hand showed an uncontrollable tendency to reach out and take hold of objects and then was unable to release them. At times the right hand interfered with tasks being performed by the left hand. She attempted to restrain it by wedging it between her legs or by holding or slapping it with her left hand. The patient would repeatedly express astonishment at these actions." Another patient reported that she was "attempting to write with her left hand, the right would reach over and take the pencil. The left hand would respond by grasping the right hand to restrain it."

In some instances, patients may display alien movements in both hands (Gasquoine 1993; Goldberg & Bloom 1990) as well as alien vocalization of thoughts. For example, a patient described by Gasquoine (1993) had a propensity to reach out and touch female breasts, as well as novel objects and persons. He reported this caused him great embarrassment and that he would

typically attempt to take hold of his right with his left hand or voluntarily grasp objects, such as his lap tray, so that he would not spontaneously reach out and grab someone.

Some individuals not only have difficulty controlling their arms and hands, but their speech. That is, they may begin to speak and make pronoucements, which they claim to have no control over—as if they had been taken over and were possessed by an alien consciousness that had a mind of its own.

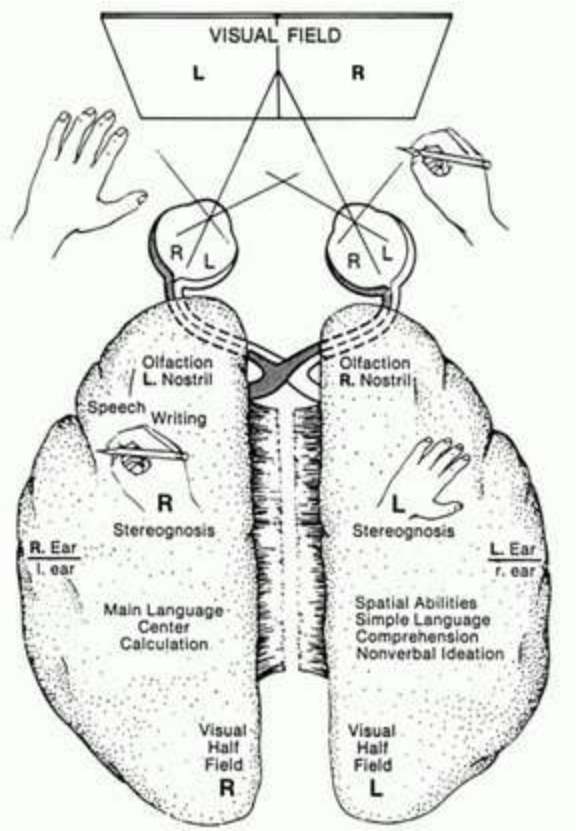
POSSESSION &AND THE SPLIT BRAIN



It is now well established that the brain is functionally lateralized, such that the temporal and sequential aspects of language are controlled by the left hemisphere, whereas visual spatial, environmental, the emotional sounds of speech, and the body image, are the domain of the right half of the brain. Because each hemisphere is concerned with different types of information, even when analyzing ostensibly the same stimulus each half of the brain may react, interpret and process it differently and even reach different conclusions (Joseph, 1988b, 1996’ 2011; Joseph et al., 1984, Levy & Trevarthen, 1976). Moreover, even when the goals are the same, the two halves of the brain may produce and attempt to act on different strategies. In consequence, functional lateralization may lead to the development of oppositional attitudes, goals and interests such that one half of the brain may desire or engage in acts that

are opposed by the other. This has been experimentally demonstrated in patients who have undergone split-brain surgery, that is, complete corpus callosotomy and the severing of the axonal pathways linking the right and left hemisphere.

For example, one split brain individual's left hand would not allow him to smoke, and would pluck lit cigarettes from his mouth or right hand and put them out. Apparently, although his left cerebrum wanted to smoke, his right hemisphere didn't approve --he had been trying to quit for years (Joseph, 1988a,b, 2011). Yet another split brain patient experienced conflicts when attempting to eat, watch TV, or go for walks, his right and left hemisphere apparently enjoying different TV programs or types of food (Joseph 1988b). Nevertheless, these difficulties are not limited to split-brain patients, for conflicts of a similar nature often plague the intact individual as well.

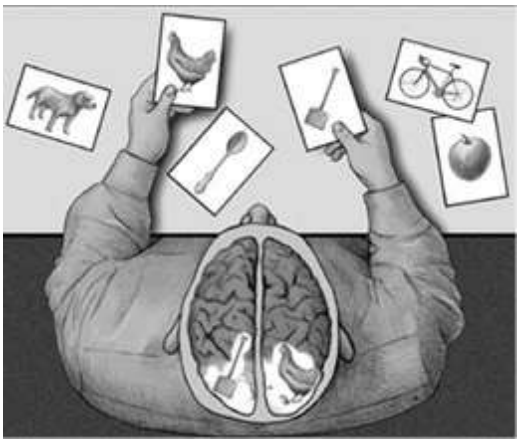


Indeed, it has been well demonstrated that each half of the brain is capable of experiencing independent and semi-independent forms of consciousness, two minds within a single brain, one in the right the other in the left

hemisphere. This has been demonstrated in studies of patients who have undergone complete corpus callosotomies (i.e. split-brain operations) for the purposes of controlling intractable epilepsy (Joseph, 1988ab). As described by Noble Laureate Roger Sperry (1966, p. 299), "Everything we have seen indicates that the surgery has left these people with two separate minds, that is, two separate spheres of consciousness. What is experienced in the right hemisphere seems to lie entirely outside the realm of awareness of the left hemisphere. This mental division has been demonstrated in regard to perception, cognition, volition, learning and memory."

For example, when split-brain patients are tactually stimulated on the left side of the body, their left hemispheres demonstrate marked neglect when verbal responses are required, they are unable to name objects placed in the left hand, and they fail to report the presence of a moving or stationary stimulus in the left half of their visual fields (Bogen, 1979; Joseph, 1988b. 2014; Levy, 1974, 1983; Seymour et al. 1994; Sperry, 1982). They (i.e., their left hemisphere's) cannot verbally describe odors, pictures or auditory stimuli tachistoscopically or dichotically presented to the right cerebrum, and have extreme difficulty explaining why the left half of their bodies responds or behaves in a particular purposeful manner (such as when the right brain is selectively given a command).

However, by raising their left hand (which is controlled by the right half of the cerebrum) the disconnected right hemisphere is able to indicate when the patient is tactually or visually stimulated on the left side. When tachistoscopically presented with words to the left of visual midline, although unable to name them, when offered multiple visual choices in full field their right hemispheres are usually able to point correctly with the left hand to the word viewed.



When presented with words like “toothbrush,” “tooth” falls in the left visual field (and thus, is transmitted to the right cerebrum) and the word “brush” falls in the right field (and goes to the left hemisphere). Hence, when offered the opportunity to point to several words (i.e., hair, tooth, coat, brush, etc.), the left hand usually will point to the word viewed by the right cerebrum (i.e., tooth) and the right hand to the word viewed by the left hemisphere (i.e., brush). When offered a verbal choice, the speaking (usually the left) hemisphere will respond “brush” and will deny seeing the word “tooth.” Overall, this indicates that the disconnected right and left cerebral hemispheres, although unable to communicate and directly share information, are nevertheless fully capable of independently generating and supporting mental activity (Bogen, 1969, 1979; Joseph, 1986b, 1988b; Levy, 1974, 1983; Sperry, 1982). Hence, in the right hemisphere we deal with a second form of awareness that accompanies in parallel what appears to be the “dominant” temporal-sequential, language dependent stream of consciousness in the left cerebrum.

Moreover, as has been demonstrated by Sperry, Bogen, Levy, Joseph and others, the isolated right cerebral hemisphere, like the left, is capable of self-awareness, can plan for the future, has goals and aspirations, likes and dislikes, social and political awareness, can purposefully initiate behavior, guide response choices and emotional reactions, as well as recall and act upon certain memories, desires, impulses, situations or environmental events —without the aid, knowledge or active (reflective) participation of the left half of the brain.

In consequence, because each half of the brain controls the other half of the body, sometimes one half of the body will engage in independent actions, such that half of the body may behave as if possessed and controlled by an alien or even a demonic force.

As reported by patients who have undergone "split-brain" surgery, the behavior of the right hemisphere is not always cooperative, and sometimes it engages in behavior which the left language dominant half of the brain finds objectionable, embarrassing, puzzling, mysterious, and upsetting.

For example, Akelaitis (1945, p. 597) describes two patients with complete corpus callosotomies who experienced extreme difficulties making the two halves of their bodies cooperate. "In tasks requiring bimanual activity the left hand would frequently perform oppositely to what she desired to do with the right hand. For example, she would be putting on clothes with her right and pulling them off with her left, opening a door or drawer with her right hand and simultaneously pushing it shut with the left. These uncontrollable acts made her increasingly irritated and depressed." On several occasions it tried to slam a drawer on her right hand, and on a number of instances the left hand (right hemisphere) attempted to take her clothes off, even though that is not what she (i.e. the left hemisphere) desired to do.

Another patient experienced difficulty while shopping, the right hand would place something in the cart and the left hand would put it right back again. Both patients frequently experienced other difficulties as well . "I want to walk forward but something makes me go backward." A recently divorced male patient noted that on several occasions while walking about town he found himself forced to go some distance in another direction. Later (although his left hemisphere was not conscious of it at the time) it was discovered (by Dr. Akelaitis) that this diverted course, if continued, would have led him to his former wife's new home.

Geschwind (1981) reports a callosal patient who complained that his left hand on several occasions suddenly struck his wife—much to the embarrassment of his left (speaking) hemisphere. In another case, a patient's left hand attempted to choke the patient himself and had to be wrestled away. Bogen (1979, p. 333) indicates that almost all of his "complete commissurotomy patients manifested some degree of intermanual conflict in the early postoperative period." One patient, Rocky, experienced situations in which his hands were uncooperative; the right would button up a shirt and the

left would follow right behind and undo the buttons. For years, he complained of difficulty getting his left leg to go in the direction he (or rather his left hemisphere) desired. Another patient often referred to the left half of her body as "my little sister" when she was complaining of its peculiar and independent actions.

A split-brain patient described by Dimond (1980, p. 434) reported that once when she had overslept her "left hand slapped me awake." This same patient, in fact, complained of several instances where her left hand had acted violently. Similarly, Sweet (1945) describes a female patient whose left hand sometimes behaved oppositionally and in a fashion which on occasion was quite embarrassing.

Similar difficulties plagued a split-brain patient whom I reported on (Joseph 1988b). After callosotomy, this patient (2-C) frequently was confronted with situations in which his left extremities not only acted independently, but engaged in purposeful and complex behaviors —some of which he (or rather, his left hemisphere) found objectionable and annoying.

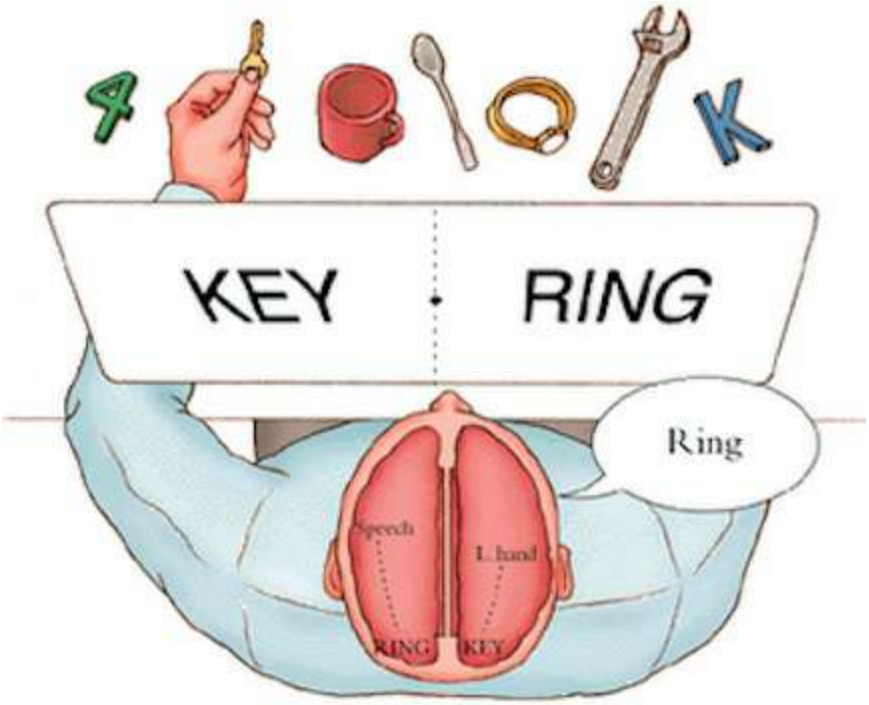
For example, 2-C (the speaking half of his his brain) complained of instances in which his left hand would perform socially inappropriate actions (e.g. attempting to strike a relative) and would act in a manner completely opposite to what he expressively intended, such as turn off the TV or change channels, even though he (or rather his left hemisphere) was enjoying the program. Once, after he had retrieved something from the refrigerator with his right hand, his left took the food, put it back on the shelf and retrieved a completely different item "Even though that's not what I wanted to eat!" On at least one occasion, his left leg refused to continue "going for a walk" and would only allow him to return home.

In the laboratory, he often became quite angry with his left hand, he struck it and expressed hate for it. Several times, his left and right hands engaged in actual physical struggles. For example, on one task both hands were stimulated simultaneously (while out of view) with either the same or two different textured materials (e.g., sandpaper to the right, velvet to the left), and the patient was required to point (with the left and right hands simultaneously) to an array of fabrics that were hanging in view on the left and right of the testing apparatus. However, at no time was he informed that two different fabrics were being applied. After stimulation the patient would pull his hands out from inside the apparatus and point with the left to the

fabric felt by the left and with the right to the fabric felt by the right.

Surprisingly, although his left hand (right hemisphere) responded correctly, his left hemisphere vocalized: “That’s wrong!” Repeatedly he reached over with his right hand and tried to force his left extremity to point to the fabric experienced by the right (although the left hand responded correctly! His left hemisphere didn’t know this, however.). His left hand refused to be moved and physically resisted being forced to point at anything different. In one instance a physical struggle ensued, the right grappling with the left.

Moreover, while 2-C was performing this (and other tasks), his left hemisphere made statements such as: “I hate this hand” or “This is so frustrating” and would strike his left hand with his right or punch his left arm. In these instances there could be little doubt that his right hemisphere was behaving with purposeful intent and understanding, whereas his left hemisphere had absolutely no comprehension of why his left hand (right hemisphere) was behaving in this manner.



EMOTIONAL TRAUMA, POSSESSION & THE SPLITTING OF CONSCIOUSNESS

It has been demonstrated experimentally, that even the normal brain may experience similar episodes of functional disconnection between the right and left hemisphere (Joseph et al., 1984; reviewed in Joseph,1988a) such that the individual may feel possessed or experience an evil, alien presence. In part, this is a consequence of functional lateralized and the specialization of each half of the brain, and right hemisphere dominance for emotion and the body image. However, these conditions also sometimes occur during episodes of extreme emotional distress which also effects the right hemisphere more strongly than the left (reviewed in Joseph, 1988a, 1996). In fact, under conditions of extreme fear, the brain may be injured, and regions in the limbic system, such as the amygdala, may develop "kindling" --which is a form of seizure activity.

Specifically, under conditions of extreme fear or emotional trauma, the brain secretes and releases a cascade of neurochemical and stress hormones, including corticostereoids, enkephalins, norepinephrine (NE), serotonin (5HT), and dopamine (DA), all of which differentially contribute to the fear and stress response. Unfortunately, these neurotransmitter fluctuations negatively impact amygdala and hippocampal neurons, axons, dendrites, and their pre and post synaptic substrates (Cain, 1992; Goelet & Kandel, 1986; Kraemer, 1992; Krystal, 1990). For example, since NE also serves a neural protective function (Glavin, 1985; Ray et al., 1987b), if NE levels are reduced--a normal consequence of prolonged fear and stress-neurons are exposed to the damaging effects of enkephalins and corticosteroids which at high levels attack and kill amygdala and hippocampal pyramidal neurons (Gahwiler 1983; Henriksen et al., 1978; Packan & Sapolsky, 1990). For example, under high levels of stress, corticosteroids are secreted in massive amounts, but also directly attack and injure the hippocampus due to the abundance of Type II adrenal steroids receptors which abound within this structure (Lupien & McEwen, 1997; Pugh, Fleshner & Rudy, 1997). In addition, coupled with NE depletion, repeated or prolonged stress induced secretory episodes of corticosteroids and enkephalins can injure cells within the dentate gyrus and Ammon's horn (Lupien & McEwen, 1997) such that the hippocampus will atrophy (Lupien & McEwen, 1997; Sapolsky, 1996; Uno, Tarara, Else, & Sapolsky, 1989). As to the amygdala, it may develop

seizure activity and thus become abnormally activated.

Extreme fear is the most common emotional reaction elicited with direct electrode stimulation of the human or nonhuman amygdala (Chapman, 1960; Davis et al., 1997; Gloor, 1997; Halgren, 1992; Rosen & Schulkin, 1998; Strauss, Risser, & Jones, 1982; Williams 1956). The pupils dilate and the subject will cringe, withdraw, and cower. This cowering reaction may give way to extreme panic and the animal will attempt to take flight. Likewise, abnormal activity originating in the amygdala and/or the overlying temporal lobe can evoke overwhelming, terrifying feelings of "nightmarish" fear that may not be tied to anything specific, other than perhaps the sensation of impending death (Herman & Chambria, 1980; Strauss et al., 1982; Weil, 1956). With amygdala activation the EEG becomes desynchronized (indicating arousal), heart rate becomes depressed, respiration patterns change, the galvanic skin response significantly alters, the face contorts, the pupils will dilate, and the subject will look anxious and afraid (Bagshaw & Benzies, 1968; Davis, 1992; Kapp, Supple, & Whalen, 1994; Ursin & Kaada, 1960).

However, if the amygdala (and hippocampus) is injured or abnormally active, the individual may become emotionally abnormal, they may suffer from hallucinations, they may hear voices, and they may have dissociative episodes and feel as if they have been "possessed." The feeling of being "possessed" including the development of alternate personalities which temporarily possess and take over control from the main personality, and thus dramatic alterations in personality,have been repeatedly observed following injury to the amygdala and overlying temporal lobe (Lilly et al., 1983; Marlowe et al., 1975; Shenk & Bear, 1981; Terzian & Ore, 1955). In some cases of temporal lobe, amygdala, hippocampal abnormality, the alterations in personality are so dramatic patients may appear to be possessed by demons or suffering from a multiple personality disorder (Fichtner, Kuhlman, & Hughes, 1990; Mesulam, 1981; Shenk & Bear, 1981). In fact, in several cases of multiple personality dissociative disorder, EEG or blood flow abnormalities involving the temporal lobe have been demonstrated (Drake 1986; Fichtner et al., 1990; Mathew, Jack & West, 1985; Mesulam 1981; Schenk & Bear 1981). Moreover, some patients may shift from one personality to another following a seizure or with increases in temporal lobe activity (Mesulam, 1981; Shenk & Bear, 1981). Similarly, it has been

reported that heightened emotional distress may precedede the appearance of alternate personalities

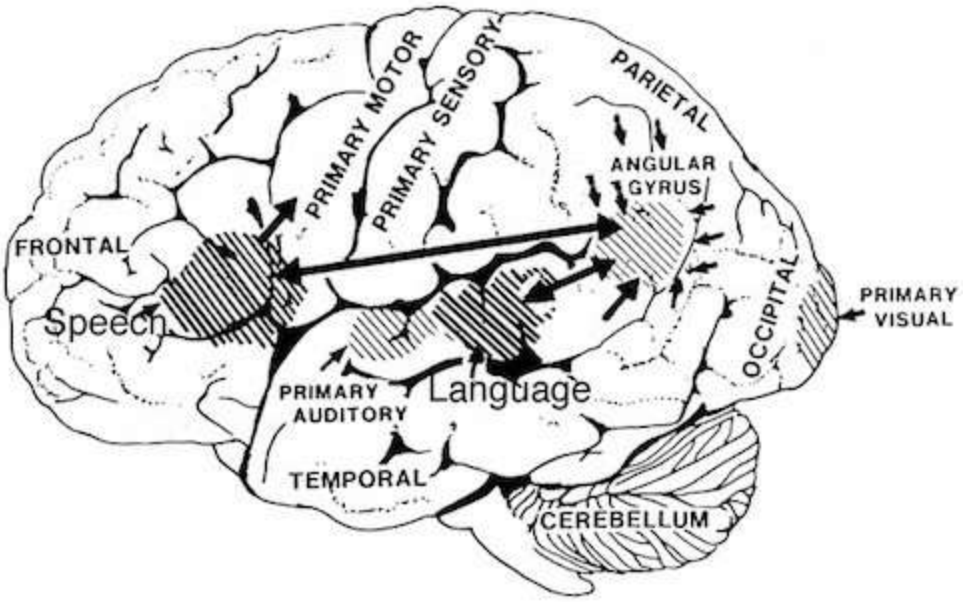
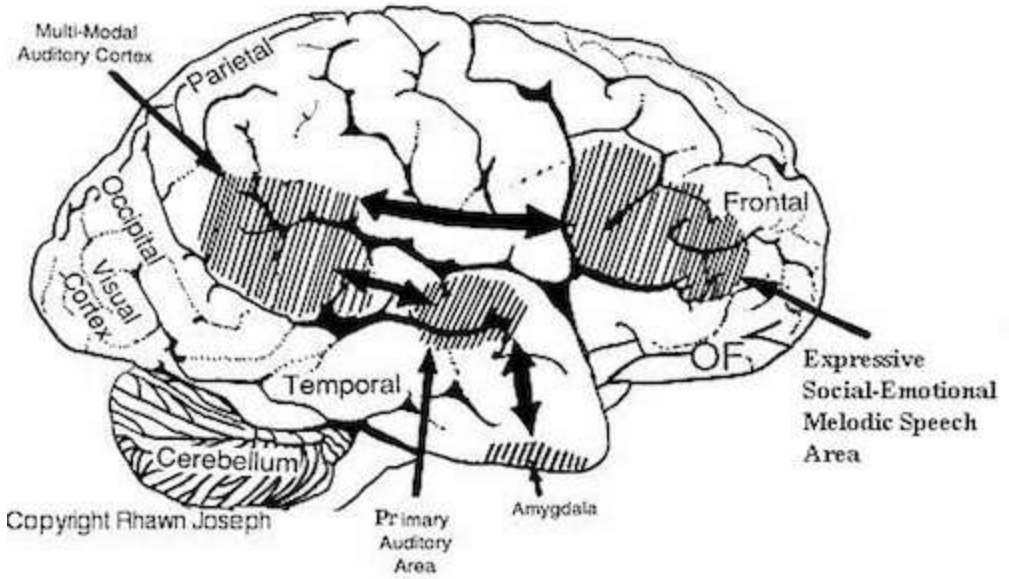


FIGURE: Language axis of the left (above) and right (below) hemisphere.



Sometimes the “voices” of the alternate personality, or the “demon... devil... god” and so on, will order the main personality to harm others or themselves. Some of these alternate personalities may also take control and engage in criminal and self-destructive acts. Some of those “possessed”honestly believe they are possessed by demons, devils, or god.

Alternate personalities may be formed during a dissociative state while a victim is experiencing a period of severe and repetitive trauma. That is, under certain traumatic (or neurological) conditions, an aspect of the consciousness may fragment, break off, and thereafter act in a semi-independent or completely independent manner.

Compared to other cortical areas, the most complex, vivid hallucinations, including out-ofbody dissociative experiences, have their source in the temporal lobe. The amygdala, hippocampus, and temporal lobe play a significant role in the production of REM sleep and dream activity (Hodoba, 1986; Meyer, Ishikawa, Hata, & Karacan, 1987), and become disinhibited in reaction to hallucinogens such as LSD, and are thus implicated in the production of LSD-induced hallucinations (Baldwin, Lewis, & Bach, 1955; Chapman, Walter, & Ross, 1963; Serafetinides, 1965). Hence, under conditions of extreme emotional stress and trauma, the hippocampus, amygdala and temporal lobe may become abnormally active, and victims may experience extreme sensory distortions and hallucinations, including out-of-body phenomenon.

Due to the development of these fear-induced sensory-distorting hallucinatory states, trees, animals, and inanimate objects may even assume demonic form and/or be invested with satanic intent. These horrible hallucinations and sensory distortions may also be committed to memory. Later, the victim may recall the "hallucination" and believe they were set upon by demons, witches and the like, and/or that they were abused in Satanic rituals, or abducted and painfully probed by demonic aliens.

Consider the Walt Disney version of "Snow White." When the woodcutter, who had been ordered to cut out her heart, urged Snow White to flee for her life, she panicked and ran into the darkening forest in near hysteria. And, as she ran and stumbled darting in tears here and there, the trees became demonic, growing eyes and wicked mouths, and gnarled arms and hands which stretched out threateningly toward her. Overcome with terror, she collapsed to the forest floor, sobbing uncontrollable.

Now, perchance, had Snow White later recalled this frightening misadventure, she may well have explained to skeptical listeners that demons had emerged from the forest, and threatened to snatch her away. and, she may truly believe this happened, for it is what she truly experienced and what she now truly remembers.

Yet others may believe they were attacked by aliens, or demons, and then spirited away to hell, or to space ships where nightmarish experiments were performed on them.

It is noteworthy that many of those reporting alien abductions, have a history of sexual molestation or severe emotional trauma, or temporal lobe epilepsy (Mack, 1994). As noted,, stress, sexual trauma and sexual activity activates the amygdala as well as the temporal lobe—structures which are associated with the production of complex and exceedingly frightening hallucinations, including those of a demonic, religious, and sexual nature including naked women, demons, ghosts and pigs walking upright dressed as people.

Hence perhaps it is not surprising that individuals who were severely traumatized or who were sexually abused, sometimes report that they were subject to bizarre sexual rituals that involved demonic (Satanic) activities (which is not to say that in some cases this may in fact be the case). And perhaps it is not surprisingly that those with histories of severe abuse, and/or who suffer from seizure disorders, may believe that demonic-like aliens lifted them into the air and took them to a room of vast proportions—descriptions which are identical to those of at least some patients during temporal lobe stimulation, and at least some individuals who are severely frightened and/or who died only to return to tell the tale.

HELL & ALIEN ABDUCTIONS

Many "abductees" claim a sequence of perceptual experience similar to those who have died and returned to tell the tale. Abductees report the presence of a bright light, or a strange illumination which may envelop them in a beam or halo of light. They feel drawn upward toward the light, and they feel and see themselves as floating in the air (Bullard, 1987; Mack, 1994; Ritchie, 1994).

Similar to those who have "experienced" life after death, abductees report going on voyages through the air, where they rapidly fly over the land or sea, to destinations including the Egyptian pyramids, New York City, and the North pole (Bullard, 1987; Mack, 1994; Ritchie, 1994). Over the course of the last fifty years there have been numerous reports of alien abductions (Bullard, 1987; Mack, 1994; Ritchie, 1994). Typically they are "abducted" while asleep or dreaming, or just upon wakening in the middle of the night -

which raises the specter of hallucination and temporal lobe limbic system activation as these structures become exceedingly active during dream sleep.

Others claim they were abducted while driving late at night, while tired and under conditions where the head lights, moon light, and oncoming lights may flicker past (Bullard, 1987; Mack, 1994; Ritchie, 1994) -thus inducing possible seizure activity. However, the religious experience of some abductees is often hellish, and the aftermath includes prolonged feelings of depression, and horror and despair. “Abductees” frequently report that once they were drawn up toward the light, they felt overwhelmed with terror and that once they “arrived” they were subjected to painful and agonizing procedures (Bullard, 1987; Mack, 1994; Ritchie, 1994). Women often report that they were stripped naked and their legs spread, and that they were sexually molested, raped, or painfully probed.

Male and female abductees frequently report undergoing painful and invasive physical exams by alien monstrosities who loom demonically, probing vaginas, wombs, the anus, the eyeballs, and the viscera, with needlelike devices, or with twisting wires, or sharp, painfully cold lance-like instruments that may deliver electric, burning, or shock like sensations (Bullard, 1987; Mack, 1994; Ritchie, 1994).

Like those who experience life after death, some abductees report undergoing a “life review.” They may see themselves or others on a viewing screen, usually engaged in sexual or violent activity. Similar sexual flashbacks are not uncommon with direct amygdala stimulation (Gloor, 1990, 1997; Halgren, 1992).

Once they return to earth and/or awake in their beds, many abductees are initially amnesic for the experience, though they may be troubled by fleeting, horrifying images and flashbacks (Bullard, 1987; Mack, 1994; Ritchie, 1994). Likewise, hyperactivation of the hippocampus can induce a temporary amnesia (Joseph, 1998a, 1999b).

They also suffer from depression, sleeplessness, anxiety and panic attacks; which again are suggestive of limbic system and temporal lobe abnormalities as well as post-traumatic stress disorder.

It is noteworthy, however, that some of those who undergo life-after-death also report exceedingly unpleasant experiences. This includes feelings of terror, sensations of terrible physical pain, the presence of demonic monstrosities, or hallucinations of people crying, moaning, screaming, and

burning in flames.

"For those who have disbelieved... shall roast in fire... and their bellies and skin shall be melted. To them it is said: Taste the punishment of the burning." -Koran

DISSOCIATION & POSSESSION

It has been repeatedly demonstrated with neurosurgical and epilepsy patients that abnormal temporal lobe/hippocampal activation can cause an individual to experience themselves as separating and floating above their body, such that they may feel as if they are two different people, one watching, the other being observed (Daly 1958; Jackson & Stewart, 1899; Penfield 1952; Penfield & Perot 1963; Williams 1956). As described by Penfield (1952) during electrical stimulation of this area, "it was as though the patient were attending a familiar play and was both the actor and audience." Likewise, children, as well as adults, who are terribly abused or traumatically stressed and frightened often report dissociative experiences including even a splitting of consciousness such that one aspect of their mind will seem to be floating above or beside their body (Courtois, 1988; Grinker & Spiegel, 1945; Noyes & Kletti, 1977; Parson, 1988; Southard, 1919; Terr, 1990). Hence, the famous aside: "He was literally beside himself with fear."

Most abusers do not wish to molest an unresponsive body, but a personality that is either excited or tormented and terrified by what is occurring. According to Courtois (1995), it is the abuser's desire "to achieve total control over the victim and her responses and for the victim to become a willing participant and to enjoy the abuse. To achieve this end, many incest offenders take great pains to sexually stimulate their victims to arousal." They may pinch, cut, and hurt them to obtain the desired reaction. Thus, although these particular children may have "split off" from their body, they are nevertheless forced to respond, as a personality, to the abuse in which case the split off, or remaining portion of the "personality" may act in accordance with the manner in which it was created.

Thus, the abuser slowly shapes a personality which is formed during periods of abuse. Hence, some alternative personalities are highly sexual, or homosexual, or angry and self-destructive, mirroring either the role they were forced to play or the personality and behavior of the perpetrator. The dissociated aspects of conscious-awareness, therefore, may slowly establish

its own independent identity; that is, an alternate personality—a personality which may be repeatedly triggered or purposefully shaped during subsequent traumas, and which may grow only to split apart again and yet again, forming multiple fragmentary personas each supported by a dissociated and abnormal neural network.

However, these "broken off" or alternate personalities, in turn, may be "state dependent" and supported by isolated neural networks maintained by the amygdala in the absence of hippocampal participation. Because the alternate "personality" essentially splits off from the main personality under certain highly stressful conditions, in general, it can only be reactivated and function independently when the individual is stressed or in a similar state of mind. Moreover, because of the state dependent nature of this partial "personality," the main personality essentially becomes amnesic regarding it. In part this is a consequence of hippocampal deactivation. When the hippocampus returns to normal, it can no longer gain access to these personal memories (which may be maintained by the amygdala), such that dissociated personal memory and the associated, albeit disconnected personality, remains isolated and inaccessible. In consequence, some victims, or their families, feel as if they sometimes are possessed.

POSSESSION & PROPHECY

Altered mental states, secondary to brain injury, seizure activity, or severe emotional trauma, by definition, encompass an alteration in consciousness. Under some conditions, what is perceived is a hallucination, a sensory distortion, or a dream-like flashback. Some may believe they have been afflicted by demons, or that they are possessed. Feelings of possession or the presence of an alien presence, can be directly attributed to neurological abnormalities in the right hemisphere, right parietal lobe, corpus callosum, and the limbic system. Prophecy, too, has been linked to hyperactive states and abnormalities in the limbic system; and individuals who make prophecies also sometimes appear to be possessed.

Signs of limbic system hyperactivity and seizure activity include loss of consciousness, trance states, dreamy states, auditory and visual hallucinations and related disturbances of the auditory and visual system involving language and reading and writing. The disturbances of language and speech are due to the involvement of the temporal lobe in auditory and reading comprehension.

That is, the language areas, upon receiving visual signals, provide the auditory equivalent to a written word so that the person knows what the written words sounds like (Joseph, 1982, 1996, 2000a).

The auditory association area in the left temporal lobe (Wernicke's receptive speech area) not only comprehends incoming speech but assists in the programming of Broca's expressive speech area in the frontal lobe. It is Broca's area which produces speech, and a tissue immediately above Broca's area subserves writing. Therefore, abnormalities in the temporal lobe can induce severe disturbances of speech including abnormalities in the ability to write and spell words. In this regard it is noteworthy that whereas Moses suffered from a severe speech impediment and was slow of tongue, Muhammed, God's messenger, was apparently dyslexic and agraphic. He was unable to read or write.

On the other hand, hyperactivity in these limbic and temporal lobe structures can also induce pressured speech and writing. The afflicted individual may feel compelled to preach and to write out their mystical thoughts (Joseph, 2000a). Certain individuals who develop "temporal lobe epilepsy" or irritative lesions to this tissue, may suddenly become hyperreligious and spend hours reading and talking about the Bible or other religious issues. They may spend hours every day preaching or writing out their mystical or religious thoughts, or engaging in certain actions and movements they believe have religious significance. Many modern day religious writers who also happen to suffer from epilepsy are in fact exceedingly prolific, whereas conversely, those who feel impelled to preach tend to do just that. In fact, many of the prophets reported that they felt forced to preach and prophecies even though they struggled not to.

Temporal lobe hyperactivity or temporal lobe epilepsy is not usually associated with tonic clonic seizures and patients do not flail about on the ground, though they may certainly lose consciousness and move their hands and arms in a ritualistic manner. And yet, they may also retain the power of speech--though what they say may sound like jibberish. In some instances, particularly if the amygdala and amygdala-striatum is impacted, the patient may appear to be in a trance. They may experience pleasant or unpleasant odors, heart palpations, difficulty breathing, excessive sweating, and disturbances of movement, ranging from a complete freezing of the body to spasmodic movements of the arms and legs (Joseph, 1999a, 2000a).

Following a temporal lobe seizure the patient may stagger about like a "stunned ox." In this regard when the prophet Jeremiah experienced the

Lord God, his arms and legs convulsed and he staggered about like a drunk.

The presence of "god" may be experienced through dreams, through visions, and through voices—and it is usually a terrifying experience which grips the prophet like a seizure: "And I saw this great vision, and there remained no strength in me, for my comeliness was turned in me into corruption, and I retained no strength" (Daniel, 10:8); he defecated and urinated, as he fell to the ground—a not uncommon manifestation of certain seizures.

Daniel claimed he immediately lost consciousness before being confronted by the Lord god: "Thus was I in deep sleep on my face, and my face toward the ground" when an angel appeared in a prophetic vision (Daniel 10:9).

Likewise, Abraham would lose consciousness just prior to experiencing these "visions" or upon hearing the voice of the Lord God. "And a deep sleep fell upon Abraham (Genesis, 15:1,2).

In addition, and as discussed in earlier chapters, hyperactivity in this area of the brain can induce terror and severe depression, auditory and visual hallucinations, as well as religious fervor and even feelings of possession.

CASE HISTORIES

Consider Mary (described by Mesulam, 1981), a 26 year old female, A-average college student. For several months she had been complaining of odd mystical experiences involving alterations in consciousness, accompanied by auditory and visual hallucinations as well as frequent experiences of deja vu. These mystical experiences soon progressed to feelings of being possessed by the Devil. She was convinced the Devil was urging and trying to make her do horrible things to other people or to herself. She also claimed he would sometimes loudly cackle inside her head. Finally, a priest was brought in and a rite of exorcism was performed, as the Catholic hierarchy became convinced of the authenticity of her experiences, that she was possessed. However, her condition failed to improve. Finally an EEG was performed and abnormal activity was discovered to be emanating from both temporal lobes.

Another 44 year old female college graduate suffering from temporal lobe abnormalities instead came to believe she was possessed by God and at times also thought she was the Messiah, and at the behest of God, had a special mission to fulfill (Mesulam 1981). At the urging of the "God" she ran for public office and almost won. However, she also engaged in some rather bizarre actions including widespread and inappropriate sexual activity - another manifestation of limbic hyperactivation.

In a classic case described over 120 years ago by Sommer (1880), a 25 year-old man who suffered several seizures a day, claimed to have had repeated conversations with God. God's voice spoke to him quite clearly. One day, God told him he was Jesus Christ and to go forth and perform miracles. The first miracle he was to perform was to fly through the air. So convinced was he that these revelations were real, and that he was in fact "The Christ" that this young man climbed up on a roof and leaped into the air. At autopsy he was found to have a hard sclerotic lesion of the right Ammon's horn; i.e. the hippocampus. Sommer (1880) concluded that these religious hallucinations (and all hallucinations and sensory illusions) were directly due to abnormalities in this and adjoining tissue—which includes the amygdala; the two core structures of the limbic system and temporal lobe.

MUHAMMED

In order to receive the word of God, Muhammed would typically lose consciousness and enter into trance states (Armstrong 1994; Lings 1983). However, he had his first truly spiritual-religious conversion when he was torn from his sleep by the archangel Gabriel who enveloped him in an terrifying embrace so overpowering that Muhammed's breath was squeezed from his lungs.

"Recite!" (iqra!) the angel demanded. Muhammed refused: "I am not a recitor!"

The angel again enveloped him in a crushing embrace, squeezing the air from his lungs. Again the angel demanded: "Recite!" and again Muhammed refused. And then the angel crushed him a third time, at which point words began to pour from Muhammed's mouth:

"Recite in the name of thy Sustainer, who has created—created man out of a germ-cell! Recite—for thy Sustainer is the Most Bountiful, One who has taught (man) the use of pen—taught him what he did not know!"

Because the angel forced Muhammed to recite the words of God, it is for this reason that the book of Islam is called the qur'an: "Recitation."

This was the first of many such episodes Muhammed had with the archangel Gabriel who sometimes appeared in a titanic kaleidoscopic panoramic form.

Muhammed was initially exceedingly distressed, horrified by what he had experienced. He also feared he may have been "possessed by a jinn," a sprite. It was commonly believed among the Arabic community that some people had their own individual, personal jinni who could provide them with good luck and inspiration.

Muhammed did not know what to think. Shattered by the experience and overcome with feelings of suicidal terror and depression, Muhammed finally decided to throw himself from a cliff. Again the angel Gabriel appeared to him as he stood at the precipice.

According to Muhammed: "I heard a voice from heaven saying, O Muhammed! thou art the apostle of God and I am Gabriel. I raised my head toward the heavens to see who was speaking, and lo, Gabriel in the form of a man with his feet astride the horizon... I turned my face away, but toward whatever region of the sky I looked, I saw him there."

Escape was impossible. Horrified, terrorized, and depressed by what he considered a "loathsome" experience, and fearing that he was "possessed by a jinn," Muhammed crawled on his hand hands and knees and flung himself into the lap of his wife, and begged her to shield him from the divine presence. "Then I told her the whole story." She soothed him and after listening to him describe his ordeal, she suggested that they speak with her cousin, "Waraqa, a Christian who knew scripture."

Eventually, Muhammed reluctantly accepted his fate, and in accordance with the voice of "God" or his angels, Muhammed not only spoke the words of "God" but began reciting and chanting various themes of God in a random order over the course of the following 20 years; an experience he continued to find quite painful and wrenching (Armstrong 1994; Lings 1983). "Never once did I receive a revelation without feeling my soul being torn away from me."

In order to receive his revelations, Muhammed also entered into a trance state and would lose consciousness. He reported that a heaviness would fill him with a feeling of depression and grief, and that he would sweat profusely.

He also stated that although the divine message was often clear, at other times it was a jumble of sounds and voices, "like the reverberations of a bell. And that is the hardest upon me; the reverberations abate only when I understand the message."

LOT

Epilepsy can be due to a number of different causes, such as head injury, heat stroke during infancy, and tumors. However, the predisposition to develop epilepsy can also be inherited.

Like his uncle Abraham, Lot also saw angels and talked to the Lord God. It was the Lord God's angels who warned Lot to leave Sodom; reportedly the most sexually corrupt city on Earth.

Once Lot escaped from Sodom, he celebrated by getting drunk and impregnating both his daughters who willingly snuck into his bed on two separate nights (Genesis, 20: 33-38). In fact, even before they left Sodom Lot had offered his daughters to some of the men of the city to do with as they pleased (Genesis 19: 8).

We do not know if Lot followed Abraham's example and also let other men have sex with his wife. Nevertheless, both Abraham and Lot clearly demonstrated signs of temporal lobe and limbic hyperactivation.

EZEKIAL

Many "prophets" and other religious figures also display evidence of the Kluver-Bucy syndrome—a disturbance also referred to as "psychic blindness" which is due to severe abnormalities or destruction of the amygdala. For example, patients may seek isolation, avoid people, engage in abnormal sex acts, and eat non-nutritional substance such as cigarette butts or other objects. Thus we read that Ezekiel would eat dung.

In addition, many of the "prophets" avoided people and would seek isolation—yet another characteristic of limbic and amygdala abnormalities.

Likewise we read that Ezekial isolated himself from other humans and refused to speak to others. If they approached he would withdraw. If they followed he would flee. Primates with bilateral amygdala damage respond identically.

Social isolation, however, is a common means of achieving enlightenment, and isolation also acts on the amygdala (Joseph, 1982, 1992a.

1999a,b).

It was while isolated from all human contact that Ezekial had a shattering experience which caused him to lose consciousness. He had seen a cloud of light shot through with lightning, and within that stormy light he observed a great chariot pulled by four beasts each of which had four heads with the face of a man, bull, a lion, and eagle, and each wheel of the chariot rolled in a direction different from the others. And he heard wailing, moaning, and voices that gave him commands. And he experienced a sweet taste in his mouth, like honey, when "the spirit lifted me and took me, my heart overflowed with bitterness and anger." Afterward he lay "lie someone stunned" for an entire week.

Yet other signs of amygdala hyperactivation include catalepsy and catatonia. Thus we read that Ezekial was forced to lie on one side for 390 days without moving and then on his other side for 40 days. He was in all respects completely catatonic.

Cataplexy, or in this case, what appears to be catatonia, is also known as an arrest reaction due to excessive fear (e.g. "paralyzed with fear"), or to abnormalities in the amygdala striatal medial frontal lobe emotion-motor circuit. If exceeding frightened, one may freeze and fail to move, a function of the amygdala acting on the motor centers in the striatum and medial frontal lobe (Joseph, 2011). The airline industry refers to this as "frozen panic states" and about 20% of those involved in airline or other disasters will freeze and fail to move or to take any evasive action that might save their lives.

If there is an abnormality in this emotional-motor circuit, the individual may develop Parkinson's disorder, or catatonia, in which case they may lie frozen in the same posture for weeks and months. In Ezekial's case, the possibility of amygdala hyperactivity seems to be implied; not only because of the above mentioned conditions, but as he was obsessed with sexuality and often employed violent sexual imagery when he prophesied.

MOSES AND TEMPORAL LOBE LIMBIC HYPERACTIVITY

The story of Moses is part mystery, at least regarding his paternal origins. We are told that he was raised in the palace of the Pharaoh of Egypt who regarded him as a grandson. Yet, the identity of his father is unknown and we are also told that his mother hid him for three months after he was born.

When she could hide him no more, she placed him in a wicker basket

among the reeds of the Nile. It was there that Moses was discovered by the daughter of Pharaoh, who in turn raised him like a son. But then we are told that the princess paid a Hebrew woman to nurse the child. When he grew to be a boy the princess named him “Moses, which means: “I drew him out of the water.” “Moses” however, was also a common Egyptian name, including that of a mighty Pharaoh: Thutmoses.

Moses had a violent temper and one day beat an Egyptian to death. Overcome with fear, when he realized the murder had been witnessed, he fled to the land of Midian where he proceeded to challenge a group of men and rescued the daughters of the local pagan priest.

Moses, the “Egyptian” then married Zipporah, the daughter of the priest. It was later, after the birth of his son, Gershom, and while alone and isolated and attending a flock of sheep in the wilderness, near the mountain of God, that the Lord God appeared and spoke to him from inside a blazing bush.

The Lord God then proceeded to instruct Moses as to what he should say to the Israelites: “The Lord, the god of your fathers, the God of Abraham, the God of Isaac, the God of Jacob has sent me to you.” But “Moses answered and said to the Lord, Please O Lord, I have never been a man of words.

I am slow of speech and slow of tongue.” Indeed, his speech was so garbled the Lord God decides to appoint Moses’ brother Aron to assist him: “You shall speak to him and put the words in his mouth.” Possibly, Moses requires an interpreter because he does not know the language of the Hebrews; being raised as a prince in the household of the Pharaoh. However, he also required Aron to speak for him to Pharaoh. Thus it appears that he may well have had a severe speech impediment as he claims. In fact, coupled with his violent temper, his severe depressions, and the possibility of auditory and visual hallucinations, it could be argued that Moses suffered from temporal lobe epilepsy: The “Divine Illness.” Seizure activity within the temporal lobe and limbic system are clearly associated with triggering religious experiences and can give rise to murderous rage reactions as well as disturbances of speech and language.

Moses may have suffered from temporal lobe seizures as a consequence of being left for days, as an infant, to bake in the hot, broiling Egyptian sun, after his mother abandoned him in a basket on

the Nile. If that were the case his infant brain could have become overheated and damaged by the high temperatures.

If Moses subsequently developed temporal lobe seizure activity, this could explain his hyperreligious fervor, his rages and the numerous murders he committed or ordered. Indeed, a recurring theme throughout the story of Exodus is that of Moses killing and repeatedly ordering human slaughter, beginning with the first Egyptian he killed, followed by the first born sons of the Egyp-

tians, then Pharaoh and the Egyptian army, and then the slaughter and death of the Hebrews who followed him out of Egypt, all 600,000 of them.

TRANCE STATES

Numerous religious figures have achieved enlightenment, or were only able to commune with god, once they entered a trance state. Buddha, for example, is said to have at first communed with gods, and then to have transcended the gods by entering a trance state which enabled him to experience nirvana.

It is said that when Buddha entered into trance that fragrant breezes swirled about him, flowers bloomed and blossomed and fell from the air, and that the Earth began to rock as the gods in heaven began to rejoice. However, one god, a demon, Mara, was alarmed. She told Buddha to remain in a state of bliss and to never, under any circumstances attempt to inform others of what he had accomplished as no one would believe him. Two other gods, however, Sakra, the Lord of the devas, and Maha Brahma begged him to teach his method to all the world. Buddha heeded their advice.

For the next 45 years he wondered all over India preaching his message. Humans could transcend suffering and the gods, and through kindness, compassion, meditation and Yoga, they could come into contact with the ultimate reality.

Trance states are said to enable one to sense and perceive what others cannot. In Buddhism it is believed that trance enables one to gain use of Power over the material world. This includes the Power (te) of not contending, the Power to use men, and the Power for causing others to act, or to prevent them from acting.

Mystics may achieve trance states through ritual and discipline or through pain, sex, fasting or drugs. These trance states have been divided into five stages by some (Buddhists), six by others (Tantra), and four by yet other mystics (Sufis).

Broadly considered, these trance stages begin with the perception of visions and voices, then progress to a non-perceptual awareness of God, followed by transcendence and a merging and becoming one with God, which is the supreme mystical act.

While in trance, some individuals not only experience a bright light, but they may be blinded by it. In some cases the light is so bright those around them will see it. Moses and Jesus both shone with a light that others could see, whereas St. Paul was blinded by the great light that shone around his head--a light which gave rise to a "hallucination" and a revelation, on the road to Damascus.

During revival meetings, it is not uncommon for revivalists to suddenly go into trance and see\ "a brightness like the sun" "everything is bathed in a rainbow of glory."

VISIONS AND DREAMS

Throughout the "Old Testament" the "Lord god" delivers his words through visions and dreams, and in some instances the words themselves constitute the "vision;" that is, like an auditory hallucination:

"And an angel said unto Israel... And an angel said unto Balaam... and Elohim said unto him... And an angel of the Lord called unto Abraham out of heaven... and Elohim said unto Noah... The word of the Lord came unto Abraham in a vision... And the Lord said unto Abraham... and the Lord said unto Jacob...and the Lord said unto Joshua... and the Lord said unto me... and the word of the Lord came unto me... "etc.

Likewise, the gods and goddesses of ancient peoples throughout the world, including for example, the gods of the ancient Romans and Greeks would speak and appear to specific, chosen people in visions and dreams; an experience also referred to as an "epiphany" or in modern psychiatric terminology, a "hallucination."

One of Jacob's many epiphanies included a dream of a ladder which stretched from heaven to earth; and angels were ascending and descending between the realms of god and man. People who suffer from periodic episodes of limbic and temporal lobe hyperactivation, such as those with temporal lobe epilepsy, may hear voices and suffer seizures which may be indistinguishable from a trance state. It is not uncommon for these seizures to be preceded by an auditory or visual hallucination or aura (Gloor, 1997;

Penfield and Perot 1963; Trimble 1991; Williams 1956). Patients can have any number of very odd hallucinations, such as smelling sweet or horrible odors, hearing voices, music, or conversations, seeing angels, demons, ghosts, and God.

The great existential author, F. Dostoevsky, apparently suffered temporal lobe epilepsy. Dostoevsky, alleged (via one of his characters) that when he had a seizure the gates of Heaven would open and he could see row upon row of angels blowing on great golden trumpets. Then two great golden doors would open and he could see a golden stairway that would lead right up to the throne of God.

Beginning with Abraham, and throughout the "Old Testament" the "Lord God" delivers his words primarily through visions and dreams, and frequently his prophets lose consciousness or enter into trance states. Many of His prophets appear to be suffering from temporal lobe epilepsy or hyperactivity.

In the 12th century, Moses Maimonides, composed a book "A Guide for the Perplexed" as a letter to R. Joseph. According to Maimonides "the Divine Will has withheld from the multitude the truths required for the knowledge of God... Do not imagine that these most difficult problems can be thoroughly understood by any one of us."

"At times the truth shines so brilliantly that we perceive it as clear as day. Our nature and habit then draw a veil over our perceptions, and we return to darkness almost as dense as before. We are like those who, though beholding frequent flashes of lightning still find themselves in the thickest darkness of night."

"For some the lightning flashes in rapid succession, and they seem to be in continuous light, and their night is as clear as the day. This was the degree of prophetic excellence attained by Moses, the greatest of prophets."

"By others, only once during the whole of night is a flash of lightning perceived. This is the case with those of whom we are informed "They prophesied and did not prophecy again." "There are some to whom the flashes of lightning appear with varying intervals; others are in the condition of men, whose darkness is illuminated not by lightning, but by a small light that is not continuous, but now it shines and now it vanishes..."

"The degrees of perfection of men vary according to these distinctions. Concerning those who never beheld the light even for one day, but walk in

continual darkness, it is written: “They know not, neither will they understand. They walk in darkness” (Psalms, 82:5). Truth, in spite of all its powerful manifestations is completely withheld from them” (Maimonides, 12th century).

The Truth revealed, however, is often a shattering experience, that grips one like a seizure. Likewise, the gift of prophecy, is not always a welcome gift, and even the role of prophet may be resisted. Moses actively resisted and argued with the “Lord God” and repeatedly tried to convince Him to pick someone more deserving. Other prophets have also attempted to resist, but to no avail. They were often hounded by the “Lord god” or his angels, or felt compelled to prophecy even when threatened with death by the people—and many a prophet was killed by the people, including the ancient Jews.

Jeremiah, for example, was openly despised and ridiculed by the ancient Jews. Nevertheless, though he wished it otherwise, he could not withhold his prophesying: “For the Word of the Lord was unto me a reproach and a mocking all day, and I said, I will not mention it, nor will I again speak in His name; but it was in mine heart as burning fire, enclosed in my bones, and I was wearied to keep it, and did not prevail” (Jeremiah, 20:8,9).

THE TRANSMITTER TO GOD

Although it is possible that certain religious figures may have been suffering from temporal lobe epilepsy, it is noteworthy that seizures are stereotypical and idiosyncratic. That is, unless an individual has several different seizure foci, each seizure is basically identical to the next and the auras and hallucinations are quite similar from one seizure to the next.

This is not the case with many of the prophets. As detailed by Moses Maimonides: “According to the books of the prophets, a certain prophet after being inspired with one kind of prophecy is reported to have received prophecy in another form. It is possible for a prophet to prophecy at one time in the form and at another time in another form. The prophet does not prophecy continuously but is inspired at one time and not at another, so he at one time prophecy in the form of a higher degree and at another time in that of a lower degree; it may happen that the highest degree is reached by a prophet only once in his life time, and afterwards remains inaccessible to him, or that a prophet remains below the highest degree until he entirely looses the faculty.”

For example, “And the word of the Lord ceased from Jeremiah” (Erza, i:1), or “And these are the last words of David” (Samuel, 23:1). Some individuals may prophecy once and only once—which argues against temporal lobe epilepsy.

ABRAHAM

In ancient Sumer (in southern Iraq around 6,000 years ago), it was believed that the Universe was ruled by a pantheon of Gods, the Anunnaki (Armstrong 1994; Kramer 1956, Wooley 1965); perhaps the same pantheon alluded to in the first chapter of Genesis.

The Sumerians also worshiped household gods and goddesses, including a personal God, which in some respects could be likened to a “guardian angel” or a spirit (totem) helper, as was common among the Plains Indians. This personal God served almost as a conscience and as a mediator between the head of the household and the great Gods which ruled the Earth and the cosmos.

Because this was a private, personal God, it was not uncommon for a believer to engage in prolonged and daily discussions with his deity (Kramer 1956: Woolley 1965). To this god one could

bear their heart and soul regarding sins, injustice, personal shortcomings and hopes for the future. Hence, this god was indeed a personal god with whom one could “talk” and maintain a special personal relationship and which served to protect the Sumerians from the Pantheon of gods who rules the Earth at that time—or so claim the ancients.

And then one day something astounding and revolutionary occurred in the mind of a man of the city, of Ur of the Chaldees, of ancient Sumer, in ancient Babylon, and birthplace of Abram a rich

Babylonian prince. Abram had left the city and began having visions and hearing voices. It was coming from his personal God and it later gave him a command (Genesis 12): “Get thee out of thy country ...and I will make of thee a great nation... and in thee shall all the families of the earth be blessed...”

And Abram and his personal god walked and talked, as God had not done since the time of Adam and Eve. And then one day this personal God came to a decision and said to Abram: “Thy name shall be Abraham, for a father of many nations have I made thee. And I will make thee exceedingly fruitful...

and I will make thee the father of many nations... and I will be their God" (Genesis 17).

Abraham, both saw and heard his God on numerous occasions both awake and dreaming, often falling on his face as God appeared. They ate together, and walked and spoke together during the heat of the day, and during the darkest hours of the night. This Lord God, the "God of Abraham" was also making all types of grandiose promises and predictions, all of which came to pass.

PROPHECIES FULFILLED

Is it possible that Abraham was dreaming? Could this personal God from ancient Ur have been but a hallucination, and given Abraham's odd sexuality and murderous actions, a product on tempo ral lobe epilepsy or subclinical seizure activity?

When we consider that this is the same Lord God (at least in religious theory) who today is worshiped by Jews, Christians, and Moslems alike, the possibility of hallucinations does not seem likely. Indeed, has not the Lord God's prophecy to Abraham come to pass: "And I will make thee the father of many nations... and I will be their God" (Genesis 17).

In fact, given that the God experienced by Abraham and Sara (and in fact, with few exceptions, the God repeatedly described in the Bible) not only appeared as a man but behaved as a man and not a spirit-like supernatural being, the possibility of hallucinations does not seem likely.

Likewise, when we consider how many other prophesies were fulfilled, including the repeated destruction and recreation of Israel, including, most recently in 1948—the aftermath of a world war led by an Austrian German-Jew, Adolf Hitler—as well as the hundreds of millions who worship a

Jew (Jesus) as "God," it borders on the irrational to simply dismiss these events as a hallucination, a myth, or a coincidence.

Under conditions of limbic hyperactivation, not all "hallucinations" are hallucinations, but instead may represent the perception of stimuli which are normally filtered from consciousness. Under conditions of sensory deprivation, pain, social isolation, drug use, the nuclei of the limbic system may become abnormally activated and possibly hyperactivated such that subclinical seizure activity (kindling) develops (Cain, 1992; Gloor, 1997; Joseph, 1999b,d).

Under conditions of limbic kindling, hyperactivation, or seizure activity, sensory and emotional filtering that normally takes place in these nuclei is reduced or abolished. That is, the individual may begin to perceive things or individuals that (presumably) do not exist, or they may gain access to "hidden" knowledge that bursts upon them with a shattering clarity, or they may achieve a "higher" understanding of existence and the nature of reality. They may commune directly with god, goddesses, devils, demons, and angels.

As these same nuclei are also implicated in dream states, near death experiences, and out-ofbody phenomenon, it could thus be argued that individuals who for whatever reason are "blessed" with an overactive amygdala-temporal lobe are also given access to god-like stimuli which are also normally filtered from consciousness.

"Know that for the human mind there are certain objects of perception which are within the scope of its nature and capacity to perceive; on the other hand, there are amongst things which actually exist, certain objects which the mind can in no way grasp: The gates of perception are closed against it. Further, there are things which the mind understands, one part, but remains ignorant of the other. And when man is able to comprehend certain things, it does not follow that he may be able to comprehend every thing."-Moses Maimonides

Moreover, consider the prophecies delivered to Muhammed. In less than fifty years all the Arabic tribes had been converted to Islam.

Or consider the prophecies of the god of the cross, that is, the Mayan and Aztec God, Quetzalocoatl. Quetzalocoatl, the plumed serpent, was associated with the planet Venus, and the sign of the cross was one of his many emblems which is depicted in the center of his shield. According to Mayan and Aztec religious belief, Quetzalocoatl, the god of the cross, had been driven from the lands at the time of the great flood, some 12,000 years ago. However, it had been prophesied that Quetzalocoatl, the plumed serpent and god of the cross, would return to Mexico and that the ruling gods, and their temples, would be completely overthrown. In fact, an exact date was given for his return, which would be signified by the appearance of a comet in the East. In the Christian calendar this was to be in the year 1519.

As predicted, in the year 1519 a comet appeared in the East, and soon thereafter, the plumed and helmeted Cortez and his crew, flying the Spanish

flag and the sign of the cross appeared off the

East Coast of Mexico. And, as predicted, the old god, as well as the Aztec civilization were destroyed, and the god of the cross is now worshipped not just by the Mexican, but peoples throughout the Americas. Just a coincidence?

THE PROPHECY OF THE SECOND EXODUS

Prior to and with the establishment of Israel the "Lord God" of the ancient Jewish people repeatedly threatens them with the most horrible of misfortunes and foretells, through his prophets, that they will be scattered and dispersed throughout the lands—and this is exactly what transpires, repeatedly, beginning in the 6th century B.C., when the southern kingdom of Judah was destroyed and the people marched off into exile in Babylon. It is Babylon and before that, Sumer where much of the story of creation may well have been first composed, only to be later incorporated and retold in Genesis.

And then again, almost 2,000 years ago, following their return from exile and return to the promise lands, the Lord God again warns the ancient Jews of their destruction.

"The Lord will bring a nation against you from afar, from the end of the earth, which will swoop down like the eagle... a ruthless nation, that will show the old no regard and the young no mercy." -Deuteronomy 28:47-50.

And this is exactly what transpired when Roman legions, marching under the banner of the swastika and the eagle, swooped down and destroyed the second temple. Again the Jews are driven from Israel, and dispersed throughout the lands.

But then the Lord God also tells the Jewish people that someday He will return them to the promised land. And this prophecy too was fulfilled, by no less than Adolf Hitler; a man who likened his nation to the "Holy Roman Empire" and who modeled his government after the Roman Catholic Church (which he also sought to destroy). And, Hitler's armies marched under the banner of the eagle and the swastika, the twisted cross, the "gammadion"—which is also one of the many names of god, including the Lord God of the old testament: "Tetragrammaton" ("absolute existence").

Even the word "Nazi" has a Jewish reference: "Ashkenazi." "Ashkenazis" are European Jews.

Hitler went forth according to instructions he claimed to have received from Divine Provi dence. He was to go forth and cleanse the land of Jews. He was to begin the second exodus.

HITLER AND DIVINE PROVIDENCE: SECOND EXODUS

"Behold, the people of the children of Israel are too many and too mighty for us. Come, let us deal wisely with them." -Exodus 1:9-10.

As Hitler struggled to become dictator of Germany, and as he clearly states in his book, Mein Kampf, the Jews, he preached had not only obtained positions of power disproportionate to their numbers, but they were stealing German wealth, were engaged in sex slavery, and they threatened to overwhelm society with evil and moral decay. They were like a disease, like vermin, like a cancer, and were less than human; they were like animals, subhuman. Hitler counseled that the German nation should deal wisely with them.

The same sentiments had been expressed thousands of years before, by the Pharaoh, King of Egypt.

When Adolf Hitler finally came to power, not only did the majority of the German peoples willfully and fearfully followed his dictates, but many compared him to John the Baptist, Jesus Christ and even God. "Is he John the Baptist? Is he Jesus?" Goebbels wrote in his diary. Many honestly believed they were in the presence of a German Messiah! And not just his earliest followers, but many a German general thought he was "god" and the destiny of Germany. And many shared his lowly opinion of the Jewish people, who Hitler promised to sweep from Germany and send back to their promised land.

Hitler claimed he was acting in accordance with the will of Divine Providence. He believed he had been appointed by God.

Hitler was to be the "Lord God's" angry fist which would savagely strike a scattered people, the Jews, and drive them back to Israel, the Promised Land.

The second exodus would mirror the first.

"He exalts nations, then destroys them; He expands nations, then leads

them away. He deranges the leaders of the people, and makes them wander in a trackless waste." -Job, 12:20-24

Once Hitler came to power, and as he led his nation out of the great depression to greatness, he and his government issued orders controlling Jewish breeding and sexuality; and then the Jews were barred from practicing their professions; and then the Jews were officially described as subhuman, then they were ordered to immigrate--events and laws that echo the events leading up to the first Exodus.

And just as the ancient Jews stripped the Egyptians of their worldly goods before setting off for the promised land, the German Jews who sought to immigrate were stripped of their worldly possessions. Those who remained or failed to heed the six years of repeated warnings to leave Germany were finally herded into concentration camps where they were enslaved, starved and worked to death-conditions which mirror those of ancient Egypt prior to the exodus. "And so they died, one after another, as if smitten by a pestilential destruction… And then their taskmasters threw their bodies, unburied, beyond the borders of the land, not allowing their kinsmen to even weep over those who had thus miserably perished." -Philo of Alexandria.

HITLER, POSSESSION & THE VOICE

Hitler first heard the "voice" of Divine Providence, in 1905, when he was a 17-year old youth, living in Austria. The "voice" told Hitler, he would someday become the leader of Germany, and would lead "God's people" back to the land of their fathers.

Hitler and his best friend, August Kubizek, had just left the opera when the "voice" spoke through Hitler. The voice told Hitler and Kubizek that Adolf would someday become the savior of Germany. The Voice explained: Hitler had received a mandate from god, and would someday receive a mandate from the people, to lead them out of their servitude and to lead them back to the land of their fathers. The Voice declared that Hitler had been chosen by Providence and had been given a Divine mission. Adolf Hitler was destined to establish a new social order, a new Reich which would be established under his leadership... The 17-year old Hitler had received a mandate to lead God's people to the heights of freedom and back to the promised land.

Kubizek was amazed and shocked by the voice and the transformation he observed in Hitler. Hitler, he thought, seemed to be possessed by a demon.

Many of those who observed Hitler, later in life, also witnessed periods of possession. Hitler, a plain, and somewhat funny looking man, would suddenly become transformed, as if--according to those who observed the transformation--he was possessed by a demon: a demon who could weave a spell upon the German people by speaking with Hitler's voice.

"Listening to Hitler one suddenly has a vision of one who will lead mankind to glory... A light appears in a dark window. A gentleman with a comic little moustache turns into an archangel... The archangel flies away... and there is Hitler sitting down, bathed in sweat with glassy eyes..." —Gregor Strasser

According to Francois-Poncet, Ambassador from France to Nazi Germany, when the voice spoke, "Hitler entered into a sort of mediumistic trance..." Others were of the same opinion.

"I looked into his eyes—the eyes of a medium in a trance... Sometimes there seemed to be a sort of ectoplasm; the speaker's body seemed to be inhabited by something... fluid. Afterwards he shrank again to insignificance, looking small and even vulgar. He seemed exhausted, his batteries run down." —Bouchez

"Hitler was possessed by forces outside himself... One cannot help but think of him as a medium. For most of the time, mediums are ordinary, insignificant people. Suddenly they are endowed with what seems to be supernatural powers which set them apart from the rest of humanity. These powers are something that is outside their true personality—visitors, as it were from another planet. The medium is possessed. Once the crisis is past, they fall back into mediocrity. It was in this way, beyond any doubt, that Hitler was possessed by forces outside himself—demoniacal forces of which the individual named Hitler was only a temporary vehicle." —Rauschning.

Hitler tells us in Mein Kampf and in his other writings and comments, that throughout his life; he was guided by the "voice" --a voice which would repeatedly protect him from harm, and which guided his rise to power.

For example, he relates the following experience during the first World War. "I was eating dinner in a trench with several comrades. Suddenly a voice seemed to be saying to me, "Get up and go over there." It was so clear and insistent that I obeyed automatically. I rose to my feet and walked twenty

yards. Then I sat down to go on eating. Hardly had I done so when a flash and deafening report came from the part of the trench I had just left. Every member in it was killed."

Remarkably, although he served as a runner (messenger) during the first World War, and although the average war time life span of a runner was just a few days, Adolf Hitler nevertheless survived in this position for several years with only minor injuries—a good fortune that he also attributed to Divine Providence.

In Mein Kampf Hitler explains that following the only time he was seriously injured, following a gas attack in the closing days of World War I, he experienced a vision, and heard a voice, which taunted him and then explained why he was being spared: "And then the Voice thundered at me: "Miserable wretch, are you going to cry when thousands are a hundred times worse off than you!" And then, the

Voice spoke again and he experienced a vision of the utmost clarity: "I was being summoned to save Germany.... I would go into politics."

It was soon after that terrifying and "wonderful" vision, that others too, began to believe that Hitler had been chosen by God.

Dietrich Eckardt, a highly influential and powerful member of the secret mystical organization, the "Thule Society" and one of the founding members of the National Socialist Party, met Hitler in 1919, and announced after their first meeting: "He is the one..." Eckardt and other German mystics had been waiting for the coming of a German Messiah, one who would lead the German nation and the German people in a battle between the gods... and who could serve as a bridge between this world and a mystical world from the past--a world of mythical heroes, demons and gods. Eckardt was convinced that Hitler was the Messiah they had been waiting for--that Hitler had been chosen by god.

Eckardt took Hitler under his wing, and initiated him into the mysteries of the most diabolical of secret societies. As he lay dying, in 1923, Eckhart bragged. "We have given him the means of communicating with Them."

Hitler, too, admitted to communicating with Them. "I will tell you a secret," he once confided to one of his top deputies, Rauschning. " I have seen Him. He is intrepid and cruel. I was afraid of him."

Hitler was especially afraid that "He" would come at night, while Hitler slept and dreamed. As related by Albert Speer and others, Hitler was fearful

of being alone at night. He also had trouble falling asleep and staying asleep. He often wanted company into the late hours of the night. Hitler frequently voiced a fear of falling asleep when by himself. He sometimes dozed off only to awake with a frightened and hysterical shout, screaming that someone or something was in his room.

As described by one of his followers:

"Hitler wakes at night with convulsive shrieks; shouts for help. He sits on the edge of his bed, as if unable to stir. He shakes with fear making the whole bed vibrate. He gasps, as if imagining himself to be suffocating."

On one occasion, after awakening his staff with cries for help, they rushed to his room only to observe as "Hitler stood swaying in his room, looking wildly about him. 'He! He! He's been here!' he stamped and shrieked in the familiar way." On another occasion he awoke and cried out: "There! There! Over in the corner! He is there." On yet another occasion he awoke screaming and in convulsions. When his attendants ran into the room they found "Hitler standing, swaying and looking all around. "It's he, it's he'" he groaned. 'He's come for me!' His lips were white; he was sweating profusely. Suddenly he uttered a string of meaningless figures, then words, and scraps of sentences. It was terrifying." —Rauschning.

Yet, although Hitler admitted that this presence was"intrepid and cruel. I was afraid of him," he nevertheless relished being the chosen one, that he had been chosen by divine providence. He bragged of it.

As Fuehrer of Germany, he repeatedly spoke of hearing "Divine" voices, and claimed that he was following "the commands that Providence has laid upon me… Divine power has willed it... Not even if the whole party tried to drive me to action, I will not act. But if the voice speaks, then I know the time has come to act."

"There is a higher ordering, and we are all nothing else than its agents." - Adolf Hitler.

HISTORY REPEATS ITSELF

"We are often accused of being the enemies of the mind and spirit. Well, that is what we are, but in a far deeper sense than bourgeois science, in its idiotic pride, could ever imagine." —Adolf Hitler

Adolf Hitler experienced amazing success in building up Germany during

the “Great Depression.” His amazing success was the envy of the world--including the United States of America, whose President could look on only with envy.

And Adolf Hitler achieved incredible success when he went to war: destroying the armies and conquering Poland, France, and all of Europe in just a matter of months.

And then, Hitler destroyed his armies, and then Germany was destroyed. By the end of the war, in 1945, every major Germany city had been nearly reduced to rubble.

And in Palestine, the Palestinian people were being murdered, terrorized and driven from their homes by the Jews--in a repeat of the terrors that characterized the Jewish conquest of Palestine and Canaan, thousands of years before.

A little over two years later, and because of the atrocities committed by the Nazis, the United Nations granted Israel statehood. The Jews again had reclaimed their “promised land,” the land of their fathers.

GERMANY & BABYLON

Over two thousand years ago, around 600 BC., the Jewish Lord God announced through his prophets that he would enable Babylon to become a super-power in order to punish his Jews, by attacking Israel/Judea and sacking the Temple of Solomon. And this is exactly what happened.

The Jewish prophet Ezekiel, then announced that the sacking of Jerusalem and the Temple of Solomon was just the beginning of their punishments. It was only a warning. But if the Jewish people did not heed these warnings, Ezekiel also pronounced that Yahweh would use the nation of Babylon as the instrument of his wrath, and that the king of Babylon would destroy the Temple and burn the city to the ground. Approximately 6 years after this prophecy, Nebuchadnezzar, the king of Babylon, attacked and destroyed the city and the temple. The Jews were driven into exhile.

However, the Lord God, through his prophets also explained that He would then destroy Babylon, thus giving His Jews, yet another opportunity to repent of their sins, to follow His laws, and to return to Israel.

However, in order for these prophecies to be fulfilled required that Babylon become a superpower and defeat Egypt. That is, Babylon was to become an instrument of God. It would become a super power which the

Lord God would employ to make the Jews suffer, and then to force them off their land, and then to enslave them, so as to make them cry out to the Lord God. Then Babylon would be destroyed so that the Jews could return to the promised land and reestablish the state of Israel.

Around 600 B.C. the prophet Jeremiah began uttering prophecies about Babylon and Egypt and its king. According to Jeremiah 46: “This is the message against the army of Pharaoh Neco king of Egypt. “Prepare your shields, both large and small, and march out for battle! What do I see? They are terrified, they are retreating, their warriors are defeated...and there is terror on every side, declares the Lord... The day belongs to the Lord, the Lord Almightya day of vengeance, for vengeance on his foes. The sword will devour till it is satisfied, till it has quenched its thirst with blood. For the

Lord, the Lord Almighty, will offer sacrifice in the land of the north by the River Euphrates... prepare for Nebuchadnezzar king of Babylon to attack Egypt: Egypt will hiss like a fleeing serpent...The Daughter of Egypt will be put to shame, handed over to the people of the north. The Lord Almighty, the God of Israel, says: “I am about to bring punishment on Amon god of Thebes, on Pharaoh, on Egypt and her gods and her kings, and on those who rely on Pharaoh. I will hand them over to those who seek their lives, to Nebuchadnezzar king of Babylon and his officers. Later, however, Egypt will be inhabited as in times past,” declares the Lord.

And this is exactly what came to pass. Babylon again became a lone superpower that none could oppose. But according to the prophets of Israel, Yahweh was merely using Babylon, allowing this nation to become all powerful, so that he could employ it in his wrath against Judea which he proclaimed would be severely punished so that the Jewish people would learn a lesson and again follow his laws:

“In those days, at that time,” declares the Lord, “the people of Israel and the people of Judah together will go in tears to seek the Lord their God. They will ask the way to Zion and turn their faces toward it. They will come and bind themselves to the Lord in an everlasting covenant that will not be forgotten.” —Jeremiah 50: 4,5.

And that is exactly what came to pass. However, according to the prophet Jeremiah, although Yahweh would use Babylon to punish His people, Yahweh would then destroy Babylon and punish it for this sin: “This is the word the Lord spoke through Jeremiah the prophet concerning Babylon and

the land of the Babylonians: “Announce and proclaim among the nations, lift up a banner and proclaim it; keep nothing back, but say, ‘Babylon will be captured; Bel will be put to shame, Marduk filled with terror. Her images will be put to shame and her idols filled with terror.’ A nation from the north will attack her and lay waste her land. No one will live in it; both men and animals will flee away. I will stir up and bring against Babylon an alliance of great nations from the land of the north. They will take up their positions against her, and from the north she will be captured. So Babylonia will be plundered; all who plunder her will have their fill,” declares the Lord....I will punish the king of Babylon and his land as I punished the king of Assyria. But I will bring Israel back to his own pasture.” —Jeremiah 50.

And this too is exactly what came to pass.

Cyrus, the King of Persia, attacked and destroyed Babylon, and one of his first acts was to permit the Jewish exiles to return to Judea and rebuild the Temple of Solomon—an edict Cyrus recorded in the Cylinder of Cyrus, which is housed in the British Museum. According to Cyrus, he destroyed Babylon and allowed the Jewish people to return to Judea because he “was charged to do so by Yahweh, the God of Heaven.”

THE TRANSMITTER TO GOD

The question as to why any particular individual might be chosen to serve as a prophet or messenger of “God” cannot be answered here, though we can certainly consider possibilities.

Every individuals appears to be naturally “wired for god” and thus capable of receiving the word of god. However, some display signs of hyperactivity in this region of the brain which appears to enhance these capabilities—albeit in accordance with the waxing and waning activity within the limbic system and temporal lobe. Or perhaps a person who lives a highly spiritual or mystical life style perpetually activates this region of the brain and achieves what others can only hope for via drugs, fasting, self-mutilation, and isolation; i.e. access to God, or the spiritually sublime.

Or perhaps the presence of “God” triggers hyperactivity in the limbic system of those chosen to be His prophets, which thus enables them to hear and see god-like stimuli as well as causing them to demonstrate signs of temporal lobe abnormalities. That is, just as something frightening or sexual will activate limbic neurons, something exceedingly frightening, spiritual, or

god-like, might hyperactivate these same neurons, eventually creating supersensitive conditions and thus perpetually activating the “transmitter to God.”

As to the possibility that individuals such as Moses, Jesus, Abraham, Muhammed, or other “prophets” and messengers may have been hallucinating, this is not terribly likely since what they heard and experienced was often different from day to day and as there was an obvious message and plan of action that they were exposed to and which they relayed to others. Moreover, the prophecies they were given and what they were told would come to pass, came to pass!

Indeed, as the limbic system is clearly implicated in every single case, and as this region of the brain normally inhibits and filters incoming sensory stimuli, it could thus be argued that individuals who for whatever reason are “blessed” with a hyperactivated limbic system, or a limbic system which is highly “evolved,” or who are directly contacted by god, are therefore provided access to god-like stimuli and alternate realities which are normally filtered from consciousness.

“If the doors of perception were cleansed everything would appear... as it is, infinite...”-W. Blake

Indeed, what the evidence suggests is that these limbic structures periodically become hyperactivated and open up windows and doorways to alternate realities or dimension which are normally hidden from view. Under conditions of limbic system hyperactivity, what is concealed is suddenly revealed.

*****

****

***

III: QUANTUM PHYSICS OF PARANORMAL EXPERIENCES

*****

****

***

11. Synchronicity, Entanglement, Quantum Information and the Psyche

Francois Martin[1], Federico Carminati[2], Giuliana Galli Carminati[3]
[1]Laboratoire de Physique Theorique et Hautes Energies, Universities Paris
[2]Physicist at CERN, Geneva, Switzerland.
[3]Mental Development Psychiatry Unit Adult Psychiatry Service, Department of Psychiatry, University Hospitals of Geneva, Switzerland

Abstract

In this paper we describe synchronicity phenomena. As an explanation of these phenomena we propose quantum entanglement between the psychic realm known as the "unconscious" and also the classical illusion of the collapse of the wave-function. Then, taking the theory of quantum information as a model we consider the human unconscious, pre-consciousness and consciousness as sets of quantum bits (qu-bits). We analyze how there can be communication between these various qu-bit sets. In doing this we are inspired by the theory of nuclear magnetic resonance. In this manner we build quantum processes that permit consciousness to "read" the unconscious and vice-versa. The most elementary interaction, e.g.

between a pre-consciousness qu-bit and a consciousness one, allows us to predict the time evolution of the pre-consciousness + consciousness system in which pre-consciousness and consciousness are quantum entangled. This time evolution exhibits Rabi oscillations that we name mental Rabi oscillations. This time evolution shows how, for example, the unconscious can influence consciousness and vice-versa. In a process like mourning the influence of the unconscious on consciousness, as the influence of consciousness on the unconscious, are in agreement with what is observed in psychiatry.

Key Words: Synchronicity, quantum entanglement, quantum information, consciousness, unconscious.

1 Synchronicity Effects

Synchronicity phenomena are characterized by a significant coincidence which appears between a (subjective) mental state and an event occurring in the (objective) external world. The notion was introduced by the Swiss psychoanalyst Carl Gustav Jung and further studied together with Wolfgang Pauli (Jung and Pauli, 1955). Jung referred to this phenomenon as “acausal parallelism” which are linked by an “acausal connecting principle.” Synchronicity effects show no causal link between the two events that are correlated.

We can distinguish two types of synchronicity phenomena. The first one is characterized by a significant coincidence between the psyche of two individuals. An example of this type is when two friends at a distance simultaneously buy two identical neckties without having consulted each other beforehand. The significant coincidence appears as a correlation between the psyche of the two subjects, suggesting some type of psychic communication. There are many examples of such long range correlations between events which are causally unrelated, or subjects who engage in identical behaviors, often simultaneously: twins, relatives, members of a couple, friends, or scientists who make the same discoveries at around the same time.

For example, in March of 1951, a new comic strip appeared in over a dozen newspapers in the United States, featuring a little blond boy wearing a red and black striped shirt. The boy was called: Dennis The Menace. In the United Kingdom, a new character, a little boy wearing a red and black striped

shirt was introduced in a comic book, The Beano. He was also named, Dennis The Menace. The creators of both comics claimed it was a coincidence.

The second type of synchronicity phenomena, which is closer to what was advocated by C.G. Jung, happens when the significant coincidence occurs between a mental state and a physical state. In this case the physical state is symbolically correlated to the mental state by a common meaning. They appear not necessarily simultaneously but in a short interval of time such that the coincidence appears exceptional. Jung referred to these events as "meaningful coincidences."

Another more common example goes as follows: You are sitting at home and begin thinking about an old friend who you had not seen in months, when the phone rings, and its him.

Synchronistic events between mind and matter seem difficult to explain in terms of correlations between conscious or unconscious minds. For Jung, synchronistic events are remnants of a holistic reality the unus mundus which is based on the concept of a unified reality, a singularity of "One World" from which everything has its origin, and from which all things emerge and eventually return. The unus mundus, or "One World" is related to Plato's concept of the "World of Ideas," and has its parallels in quantum physics. Thus, the unus mundus underlies both mind and matter.

As already stressed, in a synchronicity effect, there is no causal link between correlated events localized in space and time. Synchronicity effects are global phenomena in space and time. They cannot be explained by classical physics. However, in the case of a significant coincidence appearing between the psyche of two individuals one can see an analogy with quantum entanglement (Baaquie and Martin, 2005).

Moreover one can possibly see synchronistic events between the mental and the material domains as a consequence of a quantum entanglement between mind and matter (Primas, 2003). For us mental and material domains of reality will be considered as aspects, or manifestations, of one underlying reality in which mind and matter are unseparated (Atmanspacher, 2004).

Synchronicity phenomena, especially those involving a correlation at a distance between several individuals, lead us to postulate non-localized unconscious mental states in space and time. Although different regions of the brain subserve specific functions (Joseph, 1982, 1992), mental states are

not exclusively localized in the human brain. They are correlated to physical states of the brain (possibly via quantum entanglement) but they are not reducible to them.

Since we study the analogy between synchronistic events and quantum entanglement, we treat mental states (conscious and unconscious) as quantum states, i.e. as vectors of a Hilbert space (Baaquie and Martin, 2005). Moreover we treat them as vectors of a Hilbert space of information (Martin, Carminati, Galli Carminati, 2009).

2 Quantum information and the Psyche

We try to apply quantum information to some functions of the Psyche. In classical information, the memory boxes are binary system, called bits, which can take only two values: 0 or 1. A quantum bit (in a shortened form qu-bit) can take all values which are superposition of 0 and 1 (more precisely all superpositions of the states /0 > and /1 >). In other words, a qu-bit can take simultaneously the values 0 and 1. Quantum information studies the monitoring of qu-bits. It studies also the transfer of quantum information from one qu-bit to another one (especially via two-qubit quantum logic gates).

As an example of a binary psychic system we have considered the phenomenon of mourning (Galli Carminati and Carminati, 2006): either mourning is achieved (qu-bit 0), either it is not (qu-bit 1). So quantum mechanics allow the existence of all superpositions of the state in which mourning is achieved with the state in which mourning is not achieved.

Quantum mechanics rests upon two fundamental properties. First it is based on the superposition principle (superposition of vector states of an Hilbert space). Second it is based on a fundamental phenomenon called quantum entanglement. This phenomenon manifests itself by the fact that a system of two, or several, quantum entangled particles is “non-separable”. In technical terms this means that the wave-function of the two-particle system does not factorize into a product of a wave-function for each particle. The quantum system describing the two particle system is a global system, a non-local one. Moreover, in such a system, the particles are heavily correlated. Therefore, if we measure a certain property of one of the two particles, destroying in this way the “non-separability” of the system, we can predict with certainty the corresponding property of the other particle, even if this one is at the other

extreme of the universe. However, there are caveats: the quantum specificity indicates that this property is not determined beforehand, i.e. before measurement. Quantum physics is a non-local and non-realistic theory. Quantum entanglement and the property of "nonseparability" are properties that are fundamentally quantum, that do not exist in "classical physics".

Assuming, with Belal Baaquie (Baaquie and Martin, 2005), the existence of quantum entanglement between the unconscious of two or several persons, we have proposed an explanation of correlations at a distance that appears between two (or several) individuals having affective links. This would constitute an explanation of synchronicity of the first type. It would be interesting to measure in a quantitative manner those unconscious correlations at a distance. May be those correlations could activate neural circuits that could be visible in nuclear magnetic resonance imaging (NMRI).

We propose to measure quantitatively the existence (or the non-existence) of such correlations during group therapies or group training, via "absurd" tests (Galli et al., 2008; Martin et al., 2007, 2009). Those experiments are currently in progress.

Quantum information applied to Psyche allows to explain a certain number of mental processes (Martin, Carminati, Galli Carminati, 2009). We suppose that the mental systems first proposed by Freud (1900, 1915a,b), i.e. the unconscious, pre-consciousness, consciousness, are made up of mental qu-bits. They are sets of mental qu-bits.

Specifically, Freud (1900, 1915ab), saw the mind as consisting of three mental realms; the unconscious, preconscious, and conscious mind, with the unconscious being the deepest, most inaccessible region of the psyche and which contains repressed memories and unacceptable feelings, thoughts, and ideas. The preconscious serves as a bridge, or passageway between the unconscious and conscious mind, and lies just below the surface of consciousness. Freud believed that unconscious impulses must pass through the preconscious which acts as a double doorway; one door leading from the unconscious to the preconscious, and the other from the preconscious to the conscious mind. In this way, the preconscious can censor information and prevent unacceptable impulses and ideas from becoming conscious. However, the preconscious is also the depository of information which has been pushed out of consciousness, and which may be shoved so deeply underground, so to speak, that the information becomes completely

unconscious. Therefore, although separated, these mental realms interact and can influence one another.

Inspired by the theory of nuclear magnetic resonance (NMR), we have built a model of handling a mental qu-bit with the help of pulses of a mental field. Starting with an elementary interaction between two qu-bits we build two-qubit quantum logic gates that allow information to be transferred from one qu-bit to the other. For example, we build the controlled-NOT (CNOT) gate in which, under certain circumstances, the information is transferred from the control qu-bit to the target qu-bit. We also build swapping in which there is a complete exchange of information between two qu-bits. In those manners we build quantum processes that permit consciousness to "read" the unconscious and vice-versa. The most elementary interaction, e.g. between a pre-consciousness qu-bit and a consciousness one, allows us to predict the time evolution of the pre-consciousness + consciousness system in which pre-consciousness and consciousness are quantum entangled. This time evolution exhibits Rabi oscillations that we name mental Rabi oscillations. This time evolution shows how, for example, the unconscious can influence consciousness and vice-versa.

The pulses of the mental field can be emitted either by consciousness (effects of will or freewill) or by the unconscious (individual, group or collective). As we said, together with quantum entanglement, they can explain the awareness of unconscious components. In this case we can say that consciousness measures the unconscious like an experimental physics device records a microscopic process. As we said, quantum entanglement explains also the influence of the unconscious on consciousness and the reciprocal influence of consciousness on the unconscious. We have studied these two types of influences in the case of mourning and we have seen how they could allow mourning to be achieved with time.

A third mental process, already mentioned above, is the quantum entanglement between two (or several) unconscious psyches. The evolution in time of the state of the two quantum entangled unconscious shows the reciprocal influence of each unconscious on the other one. Then through the interaction of their two unconscious, a psychoanalyst named Alice can help Bob to achieve relief from his mourning.

The fundamental characteristic of the most elementary interaction between two mental qubits, e.g. between a qu-bit of pre-consciousness and a qu-bit of

consciousness, is to highlight, as a function of time, oscillations between two quantum states made of two correlated qu-bits; i.e. the states /I1 > /C0 > and /C1 > /I0 > (I for “Insight” or pre-consciousness and C for “Consciousness”).

Let us notice that at the level of the brain, there is evidence of an alternating activity of the two hemispheres (Joseph 1982, 1988). This oscillation expresses itself in the phenomenon of binocular rivalry (Blake, 1989). When two images are presented to each of the two eyes of a subject, they enter in “competition” so that one image is visible while the other is not. The same happens when the subject is presented with two superposed images, a nice metaphor to represent the superposition of two quantum states.

3. The Right and Left Hemisphere

Joseph (1982, 1988) proposed that this oscillating activity and the different functions controlled by the right and left half of the brain, could explain some mental phenomenon associated with the conscious and unconscious mind, with the corpus callosum, a major cord of nerves, linking the two brain halves and thus acting as a bridge between these two mental realms. This is similar to Freud’s concept of the preconscious linking the conscious and unconscious mind. Further, Joseph (1982, 1988) linked this oscillating activity to dream recall vs dream forgetting, with the right hemisphere (the domain of visual-spatial imagery and social-emotion) producing the dream during high levels of oscillating activity, and the left (the domain of language and verbal thought) forgetting the dream due to low levels of activity.

Mental (Rabi) oscillations are still to be studied. In particular in the case of the “asleep” consciousness, the unconscious + consciousness system (or at least a part of this system) constantly oscillates between the states /U1 > /C0 > and /C1 > /U0 >. A pendulum does not measure time. For this we need a system that keeps the memory of the number of the oscillations of the pendulum. This is a function of a clock, which measures time. In a clock the oscillations of the pendulum have a cumulative effect that allows us to keep the memory of the number of oscillations. In the case of the Rabi oscillations of the unconscious (pre-consciousness)+ consciousness system, we have to imagine a system, correlated to the first one, that is subject to cumulative effects and that allows to memorize the mental Rabi oscillations. In this case, it is only thanks to the storage of the mental Rabi oscillations that consciousness or preconsciousness or the unconscious can be modified.

4. The Limbic System

At the level of the brain this memorization can be actuated by the limbic system, and in particular by the hippocampus (Joseph 1992). To be more specific, the limbic system is the domain of our emotions, and is classically associated with the "four F's:" feeding, fighting, fleeing, and sexual behavior. The amygdala and the hippocampus are some of the main structures of the limbic system, with the amygdala playing a major role in emotional memory, and the hippocampus in storing non-emotional memories. So, in some respects, the limbic system could be compared to the unconscious (Joseph 1992). The limbic system is part of the old brain, and is buried beneath the new brain, which consists of "new cortex," i.e. neocortex. It is the neocortex, particularly that of the left hemisphere, which we associate with human thought, language, rational behavior, and the conscious mind. However, it is the limbic system and the right hemisphere which become most active during dream-sleep (Joseph 1988, 1992).

For an asleep consciousness the perturbations coming from the environment are weak. In these conditions, the mental Rabi oscillations may extend over a time that can be long, probably of the order of several minutes, or more. The situation is totally different for an awaken consciousness. Its interaction with the environment, which operates via the sensory system, perturbs the interaction between pre-consciousness and consciousness and therefore interferes with the oscillations that, as a consequence, cannot last very long. The time for the awaken consciousness to receive an external stimulus being of the order of half a second. The Rabi mental oscillations cannot last more than that.

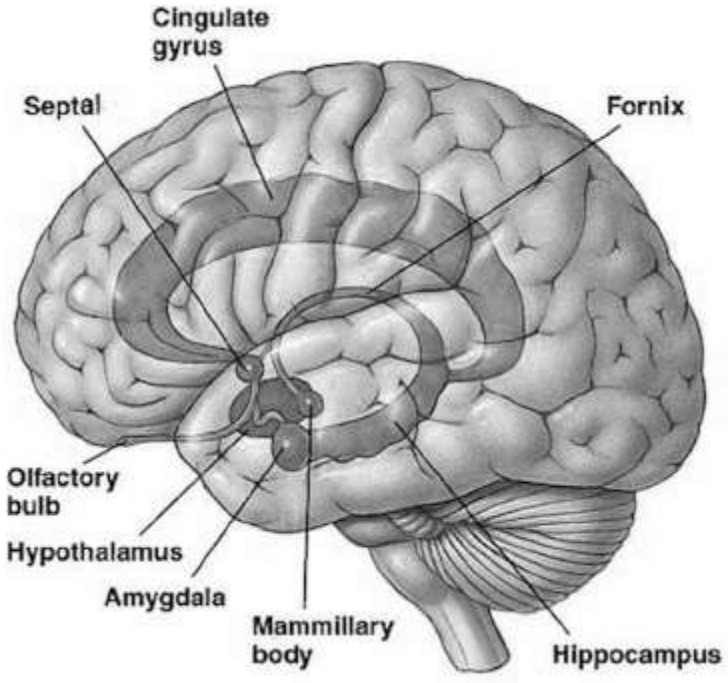


Figure: Limbic System

From a neurological perspective, this can be explained as follows: During dream sleep the left half of the brain is at a low level of activity and it cannot perceive or respond to outside sensory impressions unless they are sufficiently arousing they trigger wakefulness. By contrast, because the right half of the brain and limbic system are at a high level of unconscious-activity during dream-sleep, they can respond to external stimuli (Joseph 1982, 1988). This explains how external stimuli can become incorporated into a dream. A typical example, the dreamer is walking down a strange street when a little boy on a bike rides by ringing a bell. The bell is so loud the dreamer wakes up to discover the alarm clock is ringing. However, upon achieving full awake consciousness, the awake-consciousness may forget the dream; that is, the awake part of the psyche (the left hemisphere) forgets the dream which may remain stored in the limbic system of the right hemisphere. However, later that day, the awake dreamer sees a little boy on a bike ringing his handle-bar bell, and the awake dreamer experiences synchronicity; he remembers his dream.

This same framework can be applied to individuals who engage in the same behaviors. They may respond, unconsciously, to the same stimuli which, for a

variety of reasons may not be perceived by the conscious mind. Moreover, these unconscious realms are more closely attuned to the collective unconscious and most probably to the unus mundus, the unified reality from which everything has its origin, and from which all things emerge. Although not perceived by the conscious mind, the unconscious does respond, and then influences the conscious mind of different individuals, who then engage in the same behaviors or come up with the same thoughts or ideas.

5 Conclusions

In summary, some mental phenomena are not explainable in the framework of what we call "classical" mechanics. Let us cite, among others, the phenomenon of awareness, the correlations at a distance between individuals, and more generally the synchronicity phenomena. These three types of phenomena can be explained in the framework of quantum mechanics, particularly, thanks to quantum entanglement for the correlations at a distance between individuals (synchronicity phenomena of type I) and thanks to what we can call the classical illusion of the collapse of the wave-function for the synchronicity phenomena of type II.

Let us notice that the existence of synchronicity phenomena prevents the mental states to be reducible to physical states of the brain. The mental states are correlated to such states, probably via quantum entanglement, but they are not reducible to those states. Therefore this invalidates the materialistic hypothesis.

The projection of our subjectivity in the environment in which we live (synchronicity phenomena of type II), in agreement with quantum mechanics, refutes the local hypothesis ("each individual is in his parcel of space-time") as well as the realistic hypothesis ("the object has a reality well defined independent of the subject who observes it").

As an end let us mention a quantum effect that can have important consequences in mental phenomena, for example for awareness (for the emergence of consciousness). It is the BoseEinstein condensation, in which each particle looses its individuality in favour of a collective, global behaviour.

References

Atmanspacher, H. (2004). Quantum theory and consciousness: an overview with selected examples, Discrete Dynamics in Nature and Society, 1, 51-73 (2004)

Baaquie, B.E., and Martin, F. (2005). Quantum Psyche Quantum Field Theory of the Human Psyche, NeuroQuantology, 3, 7-42.

Blake, R. (1989). A neural theory of binocular rivalry, Psychological Review, 96, 145-167

Freud, S. (1900). The Interpretation of Dreams. Standard Edition, 5, 339-622.

Freud, S. (1915a). Repression. Standard Edition, 14, 141-158.

Freud, S. (1915b). Repression. Standard Edition, 14, 159-204.

Galli Carminati, G., and Martin, F. (2008). Quantum mechanics and the Psyche, Physics of Particles and Nuclei, Vol. 39, 560-577.

Galli Carminati, G., and Carminati, F. (2006). The mechanism of mourning: an anti-entropic mechanism, NeuroQuantology Journal, 4, 186-197.

Joseph, R. (1982). The Neuropsychology of Development. Hemispheric Laterality, Limbic Language, the Origin of Thought. Journal of Clinical Psychology, 44, 4-33.

Joseph, R. (1988). The Right Cerebral Hemisphere: Emotion, Music, Visual-Spatial Skills, Body Image, Dreams, and Awareness. Journal of Clinical Psychology, 44, 630-673.

Joseph, R. (1992). The Limbic System: Emotion, Laterality, and Unconscious Mind. The Psychoanalytic Review, 79, 405-456.

Jung, C. G., and Pauli, W. (1955). The Interpretation of Nature and the Psyche, Pantheon, New York, translated by P. Silz (1955); german original: Naturekluarung und Psyche, Rascher, Zurich (1952).

Martin, F., and Galli Carminati, G. (2007). Synchronicity, Quantum Mechanics and Psyche, talk given at the Conference on "Wolfgang Pauli's Philosophical Ideas and Contemporary Science", May 20-25, 2007, Monte Verita, Ascona, Zwitzerland; published in Recasting Reality, pp. 227-243, Springer-Verlag, (2009).

Martin, F., Carminati, F., and Galli Carminati, G. (2009). Quantum information, oscillations and the Psyche, to be published in Physics of Particles and Nuclei (2009).

Primas, H. (2003). Time-Entanglement Between Mind and Matter, Mind

and Matter, Vol. 1, 81-119.

12. Consciousness, the Paranormal and Higher Dimensions

Horace W. Crater[1] and Stan V. McDaniel[2]
[1]The University of Tennessee Space Institute Tullahoma, TN
[2]Sonoma State University (Emeritus), Rohnert Park, CA

Abstract:

In the 1800s it was hypothesized by some scientists that the actions of things or beings in a realm of four spatial dimensions, relative to which we might occupy an embedded hypersurface of only three spatial dimensions, might account for some paranormal phenomena perceived by us. That idea was subsequently dismissed. We here consider what issues might be involved if the hypothesis regarding paranormal phenomena were to be re-evaluated in view of the type of contemporary extra-dimensional theory proposed in Randall and Sundrum (Randall, 1999) and Randall (Randall 2005).

Keywords: consciousness, time, quantum physics, paranormal, hypersurface, branes, extra-dimensions

1 Paranormal Phenomena and Extra-Dimensional Theory

In his 1884 book Flatland: A Romance of Many Dimensions, Edwin A. Abbott described how things, including beings like ourselves, who live in a realm with three spatial dimensions (width, length and depth), might appear to those limited to a flat embedded surface (Flatland) having just two spatial dimensions (width and length) and unable to perceive depth. In the 1800s it was argued even by prominent scientists that our realm of three spatial dimensions might be embedded in a universe of four spatial dimensions, and that 4-dimensional beings within that larger spatial realm might be experienced by us as ghosts or spirits. These would perhaps be knowable only by mediums or clairvoyants. (A good historical account of this is to be found in Kaku, 1994).

Although this idea was eventually abandoned, here we explore whether

such paranormal phenomena as reincarnation, telepathy, communication with the dead and memories of past lives might fit into an updated analogy based on the theory that our four-dimensional universe (3 dimensions of space plus one of time) may be embedded within a five-dimensional universe (4 dimensions of space plus one of time) as such a universe is proposed in Randall and Sundrum (Randall, 1999) and Randall (Randall 2005). Our examination of the issues involves correlating various unique features of the theory with aspects of such paranormal phenomena. Our aim is not a rigorous verification of the validity of these correlations but rather an attempt at determining their degree of plausibility or implausibility; and if they appear to be plausible, what further experimental determinations may be necessary to raise the level of plausibility.

2 Higher Physical Dimensions

Renewed speculations about "extra" or "higher" dimensions have appeared in many different varieties in the physics literature since the work of Kaluza (Kaluza, 1921) and Klein (Klein, 1926) in the 1920s, and more recently with the advent of modern string theory (Green, 1984); Zwiebach, 2004). Kaluza and Klein showed that by extending Einstein's equation to a universe of five space-time dimensions they could unify the forces of gravity and electromagnetism into a single equation. In string theory, strings were hypothesized as onedimensional objects within a space which has nine spatial dimensions, (six in addition to length, width and depth). Although infinitesimally small, strings are not points, which have no spatial extension at all.

Advances in string theory in the 1990's brought about the proposal that there could be other structures in space-time with zero thickness in one or more dimensions up to one less than the proposed 9 spatial directions. Thus, for example, the possibility of two-dimensional surfaces with zero thickness was considered. Just as the string was not limited to straight, zero thickness lines, but could have arbitrary curvature and in fact be closed, so the two-dimensional surfaces could be curved and be closed like a spherical surface. The concept of "branes" then followed, being objects that had zero thickness in one or more dimensions--The electron, quark, and other fundamental particles are thought to be true points, 0D objects in 4D space-time, but always accompanied by electromagnetic or chromodynamic fields. They have

the effect of giving atoms and nuclei an effective size--angstrom and fermi respectively.

The authors have borrowed the concept of branes from the extended string theory but limit themselves to only one, two, or three extra spatial dimensions. We focus our attention on the Randall-Sundrum model (Randall, 1999, 2005) which proposes just one extra spatial dimension. In that model, the term brane describes our four-dimensional space-time (4D) as an "object" within a five dimensional (5D) space-time, called the bulk. The bulk, in addition to the time dimension, has four spatial dimensions corresponding to coordinates x, y, z and w. The brane has zero thickness in the w dimension and thus in effect has only three measurable spatial dimensions. The brane is an idealization just like the point electron, but although there is no universally accepted and tested theory for branes, like QED for the electron, treating the brane as a 0 w thickness object, as discussed later, gives results of a very profound nature, solving the Hierarchy problem. The brane and bulk are related in that the brane is said to be a kind of boundary of the bulk. As a result there will be a relation between the "size" of the bulk and that of the brane. The bulk must extend in some of its dimensions as far as does its "boundary" i.e. the brane. In the original Randall-Sundrum model (Randall, 1999), the bulk or 5-dimensional realm extends between our brane and a parallel brane (See Fig. 1). The forms of this and the following 5 figures were based on those given in (Randall, 2005).

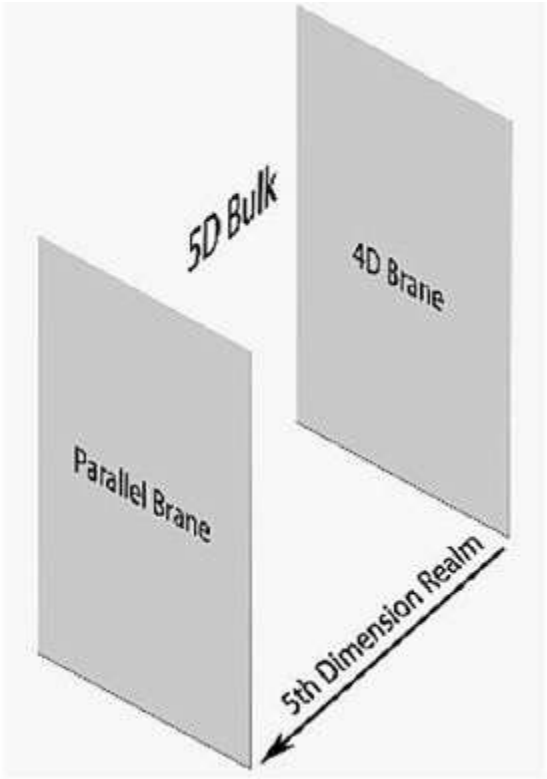


Figure 1. Randall-Sundrum Higher Dimensional Model

Returning for the moment to the "Flatland" idea, we engage in a thought experiment. Consider the model of a hand. (The content of this paragraph first appeared as a contribution of one of the authors (HWC) to a recently published book (Weiss 2012).) Take your hand and place the fingertips on a flat surface (a large enough flat surface would represent a Flatlander's Universe) Now, suppose the impression made by the fingers tips on the flat surface represents five Flatlanders. The Flatlanders are two-dimensional, having only the dimensions of length and width. Their physical interactions would correspond to the tips of your fingers becoming sufficiently near to one another on the flat surface. The fingers, however, represent larger 3-dimensional bodies of which the two-dimensional flatlanders are a kind of extension. In this hypothetical scenario instead of "ghosts or spirits" these 3-dimensional bodies would be part of the Flatlanders themselves, but unseen by them and invisible to their physical science.

This consideration raises a question regarding the mental activities of these apparently divided beings. Since the "fingers" are connected with each other

(by belonging to the same "hand"), we might imagine a possibility of the sharing of thoughts from one "finger" to another. This idea need only suppose that the mental activity of the total person is not limited to the twodimensional body in Flatland but is a capability possessed by the total self comprised of both the Flatland body and the 3-dimensional extension of that body (the "finger"). Another consequence of such a proposal is that the sense of selfhood is divided between the two "bodies" such that the Flatlander, at least, is unable under normal circumstances to be aware of the higher dimensional component of itself. This particular idea will be addressed a bit later on. In the meantime let us refer to the Flatlander as the "ego self" and the addition of the "finger" to the Flatlander as the "total self." As to what the relation between the minds and the bodies of these beings may be, we take no position but leave that as the same question that exists in philosophy and science today and has not yet been resolved.

Now what happens when the two-dimensional Flatlander dies? Lift your finger from the flat surface, leaving behind the two-dimensional "body" of the three-dimensional entity. As time passes, that same finger arches back down toward the plane, and plants itself at a different location. The finger in effect becomes associated with another two-dimensional Flatlander body. Although again the newly "born" Flatlander would under normal circumstances be unaware of the existence of its extended self, if the 3-dimensional finger retains memories of its association with its previous Flatlander body, a phenomenon similar to that of reincarnation and memories of past lives would be implied.

In our thought experiment the physical Flatlander is the action of the "tip" of the threedimensional "finger" on the surface of Flatland. The two-dimensional flatlander and the threedimensional "finger" are in some sense a single entity sharing the same consciousness, but the conceptual framework within which the Flatlander is normally constrained renders it very difficult, though perhaps not impossible, for the Flatlander to become aware of the existence of the "finger." Although (in this hypothetical scenario) the self-awareness of any individual Flatlander dissipates upon death, the death of the Flatlander does not bring about the death of its 3-dimensional extended body.

Thus we have in effect a divided self. But by the "fingertip" analogy the lower dimensional being and its higher-dimensional extension are connected, at the very least by some kind of energy exchange. What then might be the

nature of this connection? To what degree might it be a reciprocal relation? (Strangely enough this dilemma is somewhat presaged by the problem encountered by Descartes, who argued that although mind and body are separate "substances" the link between them was through the pineal gland. There was no way to explain how this link might be accomplished, since the two substances were diametrically opposed). And why should the extended higher-dimensional "body" remain after the death of its lower dimensional component? In what follows we will discuss some of these questions in relation to a version of the theory incorporating the Randall-Sundrum model.

3 Energy Relations of Bulk and Brane

Our investigation focuses on the question whether it is physically coherent to propose that conscious beings, seemingly dwelling only on a brane of zero thickness in the w direction, in fact extend into the w direction (the fourth spatial dimension). As described above, the RandallSundrum extra-dimensional concept posits a five-dimensional universe called the bulk, within which is embedded a four-dimensional universe called the brane. Applying this idea to our topic, we ask (a) whether there can be any energy exchange between bulk and brane, and (b) whether there can be enough complexity of structure within the 5D bulk to support the possibility of an extended 5D body of the 4D selves which are limited to the brane. In terms of the "fingerfingertip" analogy, the "fingertips" would be our 4D selves and the "fingers" would correspond to their 5D extended bodies located in the bulk. Also we need to address the issue of how the 5D structures might continue to exist after the death of the 4D selves.

In the models presented in (ArkaniHamed, 1998) and (Randall, 1999) all energy forms, with one exception, are unable to leave the four-dimensional brane. That one exception is gravity, in the forms of static gravitational fields, gravitational waves and their quanta, the zero mass graviton, and its harmonic excitations, the so-called Kaluza Klein particles (Landsburg, 2006; Chatrchyan, 2012). Since gravity is intimately tied to the curvature of space, it would exist in any extension of space to a higher dimension, and thus in the bulk. We will use the term gravity to refer to any of the above manifestations either in our brane or more generally in the bulk. We will use the term matter to refer to all other energy forms including electrons, quarks, photons, and every quanta of all forms of energy which in the models of ArkaniHamed

(1998) and Randall (1999) are restricted to the brane and do not penetrate the bulk (see Fig. 2).

In the Randall-Sundrum model, the five-dimensional bulk contains only gravitational energy. This would require that any extension of the material bodies of individuals in the brane would necessarily be some kind of structures, or organs, made up purely of gravity (as defined above). The total "body" of an individual would thus include a specifically gravitational component located within the bulk. How might this be possible? We consider two aspects: extension into a higher dimension and the field concept. Somewhat analogous to this is that of the point electron which by virtue of its electromagnetic field extends its influence from zero dimensions to three dimensions. Analogous to this would also be the reciprocal connection between a thin and dense material 2D plane and its gravitational field in the 3D space above and below it. The connection between the material body in the brane and its associated gravitational field in the bulk would also be reciprocal.

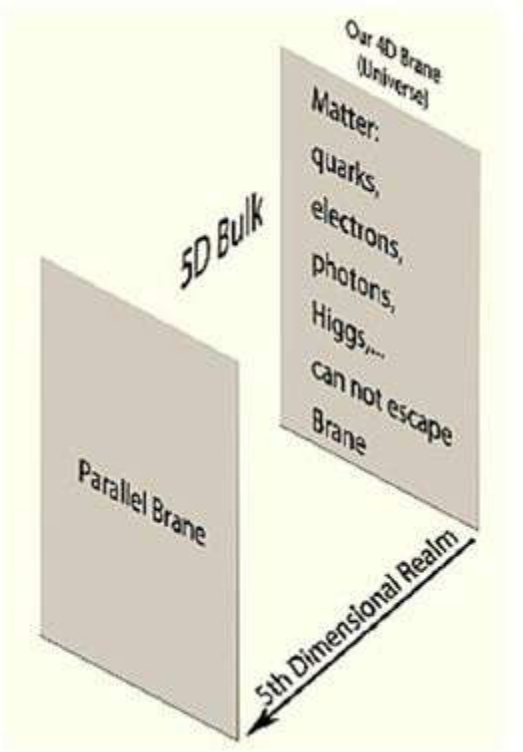


Figure 2. Matter is confined to our brane

The third question posed at the end of the last section was "why should the extended higher-dimensional form remain after the death of its lower-dimensional component"? As an analogy, consider that the source of a traveling electromagnetic wave is an accelerating charge. However, when that charge stops accelerating, the traveling electromagnetic field continues on as a pulse. Granted, we are relying on electromagnetic and lower dimensional analogies. But building on analogies is at the very heart of progress in theoretical physics. (Think of the once bizarre concept of de Broglie's matter waves and its progeny the Schrodinger equation.) However, these answers generate in turn further glaring questions. How would it be possible to detect gravitational signals from a higher dimensional space? And, wouldn't gravity's notorious weakness cut off at the start this idea of gravity being the medium through which communication between gravitational "bodies" in the bulk and material bodies in the brane might

operate? Even if detectable, how could gravity waves convey information back and forth from the material bodies in the brane (presumably in particular the brains of those individuals) to its purely gravitational extension in the bulk? With these questions in mind we now review aspects of the Randall-Sundrum theory of higher dimensional gravity.

Randall and Sundrum proposed an extra-dimensional extension of Einstein's general relativity for the purpose of solving what is known as the Hierarchy Problem (Randall, 1999). It is known that at a reasonable energy scale the electromagnetic and the weak and strong nuclear forces have approximately the same strength. The gravitational interaction, however, remains in comparison extremely weak. For example, the ratio between the attractive gravitational force between two electrons and their electrostatic repulsive force at equal distances is on the order of 10-41.

In the simplest form of the Randall-Sundrum model they found a resolution of the problem of the relative weakness of the gravitational force by proposing a two brane plus bulk model, in which our locale is the so-called "weak" brane, while on the so-called "strong" brane the gravitational interaction is comparable in strength to the other three interactions--because of this it is also referred to as the "gravity brane", here we call it simply the "parallel brane." Using very simple and plausible assumptions about the Einstein gravitational metric and source terms in the Einstein equations, in particular the tension or stress on the two branes, they then solved the resultant Einstein equations in the intervening "space" between the two branes, i.e. in the bulk. They found that the presence of tension on the branes had a dramatic effect on the strength of the gravitational interaction between the two branes. The strength decreases exponentially from the parallel brane to the weak brane by a factor of about 1016. The distance between the branes was very small (1 or 2 orders of magnitude greater than the Planck length) but the exponential factor explained the dramatic decrease in gravitational interaction. It turns out to be not so much an exponential decrease in the Newton gravitational constant as it is an exponential decrease in the inertial masses of the fundamental matter constituents in the weak brane. Because of the equivalence principle, this means that the gravitational mass of the matter constituents on the weak brane are also exponentially small compared with their counterparts on the parallel brane.

As noted above, in their model the only form of energy in the bulk is

gravity as defined above, which includes the ordinary massless gravitons but also harmonic excitations of the gravitons, called Kaluza-Klein particles. In the bulk between the two branes, if ordinary gravitons bounce back and forth between the two branes so that they have an additional kinetic energy due to their motion perpendicular to the weak brane, they in effect turn into higher vibrational modes in a wave description (as with a vibrating string tied between two fixed points, a more energetic excitation will cause the string to have more nodes). If these excited graviton states in the bulk make their way into our brane, then two very counterintuitive circumstances arise. Unlike the hypothetical spin-two graviton (two units of Planck's constant), which is massless, these excited states appear as massive spin-two particles (see Fig.3).

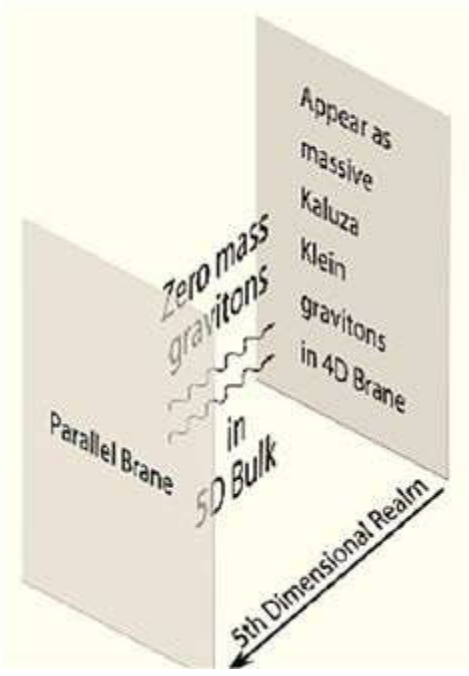


Figure 3. Imprint of higher dimensional world

To quote Randall (2005) these Kaluza Klein particles "are the four

dimensional (spacetime) imprint of the higher dimensional world." How do they pick up this extra mass? Strictly speaking, this comes from solving the 5D Einstein equation in the two brane configuration proposed by Randall and Sundrum [H. Davoudiasi, 1999]. However, one can gain heuristic insight into the origin of the Kaluza Klein masses in our 4D brane without using the 5D Einstein equation by an elementary extension of the Einstein energy mass relation $E = mc^2$. Stated in words, the fourth spatial component of the momentum (perpendicular to the brane) of the graviton in the bulk can only be perceived in the brane as an effective mass.

The second counterintuitive circumstance that arises from the graviton excitations passing from the bulk into the brane, (again derived from the same set of Einstein equations which predict the possible spectrum of higher mode gravitons (KK particles)), is that unlike the ordinary graviton, which couples very weakly to matter with Newton's constant G, the KaluzaKlein excitations of the graviton would couple to the mass of matter in the brane with a Newton's constant G multiplied by a huge exponential factor of about 10^{16} , allowing it to produce observable effects in ordinary matter. A zero mass graviton in the bulk traveling in the w direction perpendicular to the brane will be detected there in the brane as a spin-two Kaluza Klein particle with non-zero mass. Its appearance would appear to violate energy conservation in the brane. In principle such a massive particle could be detected passively by its decay to ordinary matter particles in the brane.

The same coupling of the KK particles from the bulk to ordinary matter in the brane that allows this decay would also permit the reverse of this process whereby matter particles in the brane collide with one another and produce a KK particle in the brane. Because of the connection between the KK particles and the bulk, the allowed spectrum of energies of the particles would be the same as that observed by the passive mode. In either case their subsequent decays could be detected with a clearly defined decay signature for a particle with spin 2. The model makes a range of predictions of the center of momentum energies of the excitations which will be tested at the new Large Hadron Collider (LHC). In early tests at the lower end of this range, no evidence of these excitations has been found (CMS, 2011). However, the fact that the tests have been and are actually being carried out attests that the expected strength of the interaction would be substantial.

The Einstein geodesic equations and the Einstein field equations show that

when matter is restricted to the 4D weak brane, gravity-based energy forms in the bulk are directly affected by and have a direct effect on what takes place in the 4D brane. This provides a possible physical mechanism for the interchange of energy and information between matter-based organisms in the brane and gravitational energies in the bulk. Given the above considerations, we may ask what gravity-based energy forms might there be that could transfer back and forth between bulk and brane, and would they not be overwhelmed by other energy forms?

Since gravity in our brane is incredibly weak in comparison with the other interactions, one might think that any signals between brane and bulk would be overwhelmed by the noise of other interactions. If so it would be impossible to detect in the bulk any gravitational changes associated causally with, for example, human brain activity. But since matter and its interactions are forbidden to manifest directly in the bulk, gravity would not have to compete at all with any matter-based energy forms. Therefore the weakness of ordinary gravity in the brane would not be a factor in the bulk.

However, there are plenty of gravity-based noise sources in the brane that could influence the bulk in addition to ones originating in our brains or nervous systems. If I wave the little finger of my left hand I create a gravitational disturbance perhaps at least as great, and probably much greater, than any gravitational signals coming from my brain or nervous system. But if my (hypothetical) extended self in the bulk behaves like a tuning fork, resonating only with vibrations having a frequency characteristic of the fork, this would provide a way in which that part of the bulk associated with our own 4D selves would not be overwhelmed by other gravitational disturbances either from the brane or within the bulk. This would require, of course, that gravity-based energy forms originating in the brain/brane must have a very well defined frequency.

What about gravitational energy forms entering the brane from the bulk? To be detected by the brains of organisms in the brane they would not only have to compete with other gravitational energy forms but also the myriad of matter-based energy forms. Weak, ordinary zero-mode gravity signals coming from the bulk would be virtually impossible to be noticed because they would be drowned out by the much stronger matter-based reactions. However, this would not necessarily be true of higher mode gravitons propagating into the brane from the bulk. They would indeed be much more

likely to be noticeable because they interact with matter by a factor up to 10^{16} times greater than the ordinary zero mode gravitons. This, then, might provide a mechanism whereby whatever system capable of sending a gravity-based energy form with a well-defined frequency should also be capable of receiving such forms and not be overwhelmed by the noise of other energy forms.

So if the human brain is such a system, it would have to have (or be?) a well-tuned receiver of such signals. The question, of course, is whether the brain is such a system and whether, or how, that might be verified or inferred. The 5D Einstein equations provide a derived mechanism for transferring these received higher mode gravity signals to macroscopic matter-based actions. The higher mode signals coming from the bulk would differ from the completely ineffectual zero mode gravity signals coming from elsewhere in the brane or from the bulk. Once these higher mode forms are received, evidently something of the nature similar to that which takes place with an observed quantum state must occur. Recall that an observation of a quantum state will result in what is known as the "collapse of the wave function." During this (irreversible) process, a macroscopic record (involving many atoms) of the event is made. In the case of the brain then, a quantum event gets magnified to such a state that the brain would be able to detect it. Thus the quantum event might be raised to a level of awareness.

This would, of course, require one to "quiet oneself" in order to limit surrounding disturbances. Such "quieting" may in fact take place in several circumstances: when concentrating on a problem, having an aesthetic experience, sleeping, entering into a deep state of meditation, and perhaps in a psychic trance. Since everyone sleeps, there could be an interchange of information between brane and bulk during the sleep cycle, with the other possibilities being ways of enhancing such exchange. If we extrapolate on such an idea, the possibility of some human individuals being especially sensitive to such possible signals would refer to those historically known as "psychics," clairvoyants, or mystics.

So the bulk, although devoid of any matter, of quanta of any form of energy other than gravitational, would indirectly not be devoid of the influence of all other forms of energy, since the bulk is bounded or encompassed by the brane and the energy forms there would influence not only gravity in the brane but also gravity in the bulk. Likewise, unlike zero mode gravity from

the bulk which has only infinitesimal effects, higher mode gravity from the bulk could influence matter in the brane. The possibility of "quieting" any noise which would interfere with energy exchange between human organisms in the brane and gravitational forms in the bulk might then be related to the various methods of ego-transcendence and possibly through the sleep cycle.

4 Structural Characteristics of the Bulk

Generally speaking, complexity of structure is associated with the possibility of the existence of organisms or organs of an organic system. If therefore some entities in the bulk are to be associated, through energy exchanges as discussed above, with organic systems (e.g. brains) in the brane, there would seem to be a requirement for structural complexity of entities in the bulk. We therefore turn our attention to this question.

Gravity waves in the brane (our 4D realm) are generally understood to be created by the accelerated motions of material bodies. Because there is an energy interface between the brane and the bulk, gravity waves in the bulk may also be produced by matter in accelerated motion in the brane. Since the bulk is bounded by two branes, purely gravitational structures in the bulk might then take the form of complex gravitational standing waves (see Fig.4).

Could these waves also, like their electromagnetic counterparts be capable of conveying information? The wave equations for standing sound waves and standing electromagnetic waves in the brane are linear, meaning that the standing waves could be constructed from a linear superposition of two (or more) waves traveling in opposite directions. Without this linearity, information could not be conveyed by the usual linear Fourier superpositions. The obvious problem in trying to extend the concept of standing waves capable of conveying information to gravitational waves in the bulk is that the Einstein equations (in 4D or 5D) are nonlinear. This means that in general if you have two or more solutions of the Einstein equations, then the sum of those solutions will not be a solution of the Einstein equations. This is in contrast to the linear theories in which the sum of two or more solutions of the linear wave equation is itself a solution of that wave equation. Weak gravitational standing waves would be possible in either brane or bulk since they satisfy approximately a linear wave equation. The difference between the two types of linear waves would be that in the 5D bulk there is a 'w' dependence of the wave amplitude and phase whereas in the brane there is no

such dependence since ‘w’ is fixed at 0.

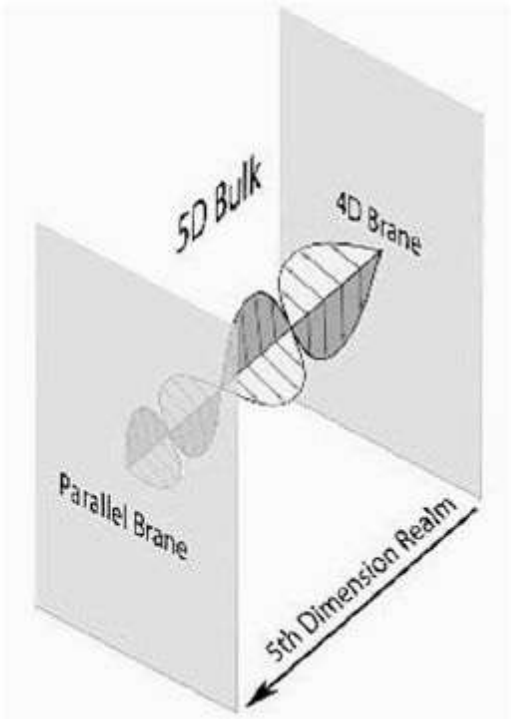


Figure 4: Gravitational Standing Waves

Even if the gravitational field is not weak so that the nonlinear terms in the equation would play an important role, a special class of standing waves solutions has been found by Stephani (2003). His testing grounds, however, are not in the context of the RandallSundrum model but in the "ordinary" 4D Einstein metric and equations. It would be relevant then to determine if such a class of exact standing wave solutions exists in the 5D RandallSundrum model. If that turns out to be the case, there would be no conflict between having stable gravitational standing waves in the bulk capable of conveying information and the nonlinearity of the 5D Einstein equations.

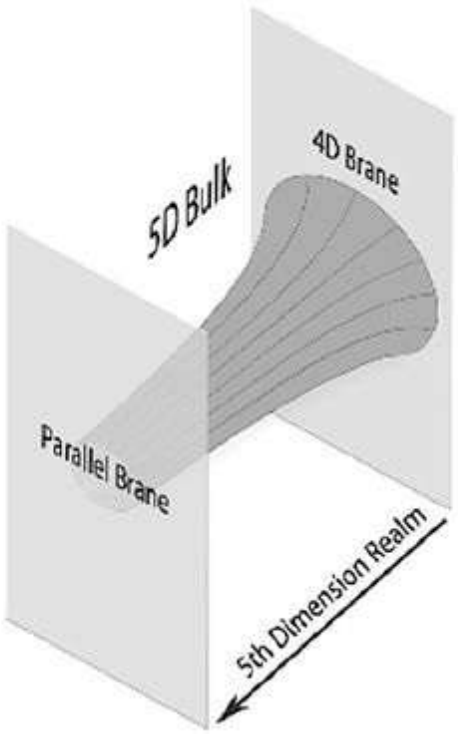


Figure 5. Corporeal (Brane), Noncorporeal (Bulk)

There are other factors which may affect the strength and/or complexity of formations in the bulk. In the two-brane Randall-Sundrum model, all massive particles in the parallel brane have an enormously larger inertial mass than they have in the weak brane. Disturbances there could therefore have greater effects within the bulk than disturbances in the weak brane. Also, although solitons and standing waves in the 5D bulk would appear mathematically similar to their counterparts in the 4D brane, their spatial extensions in the x, y, z direction may depend sensitively on the local value of w (the extra spatial dimension). Magnitudes would vary as w varies. Additionally, aside from static gravitational fields and gravity waves, there are also their quanta, the massless gravitons, and of course their excitations. Just what the strength and complexity of gravitational formations in the bulk would be remains for further research. But it is not at all beyond possibility that complex purely gravitational 5D formations capable of dynamically storing and/or transmitting information might exist in the bulk. For an idea as to just how very complex nonlinear standing waves may become, see the studies of wave

formations in a fluid medium carried out in Schwenk 1996, and the work of the Institute for Flow Sciences (Institut fuer Stroemungswissenschaften).

Since in terms of the analogy the extended self would have to be made up of 5D complex energy forms in the bulk, and since no ordinary matter inhabits this realm, this provides an interesting match for the oft-stated idea that the "spiritual" realm is not physical (where "physical" is construed as "material"). The bulk is indeed not a "physical" realm in that sense; thus it may be considered "spiritual" in that it contains no matter whatsoever as earlier defined.

We might emphasize this crucial distinction by referring to any entity made up of material substance as a corporeal entity. Then we would say that an entity of pure gravity (in the sense taken here) would be non-corporeal but it would not be non-physical. Using this terminology the speculation would be that each individual has a corporeal and a non-corporeal component (see Fig. 5).

When the 4D corporeal component terminates, the 5D non-corporeal (but still physical) component may remain. If so, the idea of the extended "body" and mind surviving after the death of the corporeal form would be supported (recall that we make no postulation regarding the specific relation of body and mind).

Another aspect of gravity in the bulk that may bear on our investigation is the possibility of information transfer (in the form of energy) from one portion to another of the bulk itself; and therefore if there are extended selves in the bulk, between such extended selves. Again we have a suggestive parallel to various forms of paranormal phenomena. Thinking of claims of telepathy, the theory would allow such communication to take place either indirectly through the brane (by energy transfer from one standing wave (the non-corporeal entity) to the 4D (corporeal) individual and then from there to another individual by ordinary electromagnetic or sound wave communication and from there by gravitational transfer of energy through the brane to the bulk as described earlier), or directly, by complicated connections between standing waves in the bulk or possibly by gravitational solitons (see Fig 6.).

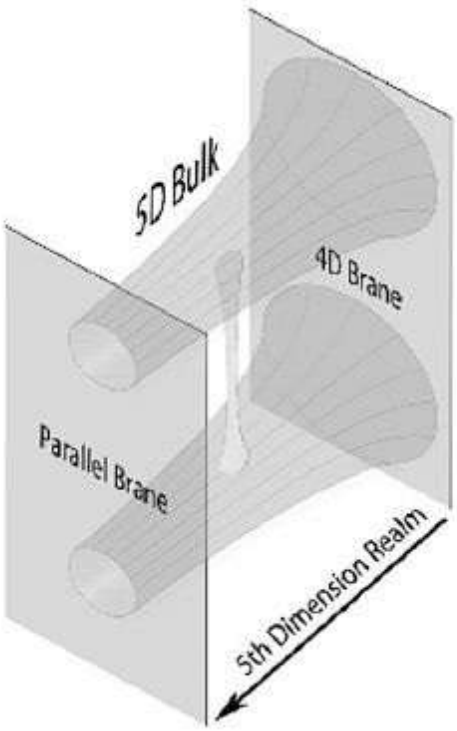

5D Bulk
4D Brane
Parallel Brane
5th Dimension Realm

Figure 6: Gravitational connections

Gravitational solitons are a feature of the nonlinearity of the vacuum Einstein equation. These are objects that move in the appropriate space-time dimensions with their shape unchanged.

Bizon et al (2007) have studied gravitational solitons in higher dimensional gravity although they did not study the Randall-Sundrum model. Their focus is on the stability of the solitons. They found evidence of stability at the linearized level and beyond for moderate sized perturbations. Also, thinking of "communication with the dead," if the corporeal body of person A dies but the extended self of A in the bulk remains and is capable of exchanging information with the extended self in the bulk of person B, who is alive in the brane, this would suggest something of that nature. Whatever levels of transfer are envisaged, if there is a mechanism for a corporeal individual in the brane (likely through his or her brain) to receive such signals, the soliton

or standing wave should be capable of conveying information. Electromagnetic waves are clearly capable of this, so their gravitational counterparts should also be capable of conveying information by similar means.

5 Is Verification Possible?

Based on the above analysis, it is our view that the Randall-Sundrum model, while subject to provisos as noticed frequently above, still provides an intriguing metaphor for the existence of certain paranormal phenomena as well as for the persistent views found in religion, philosophy and psychology asserting a wider concept of the self. In order to raise the level beyond physical metaphors into the realm of potential verification, at least four important studies would have to be undertaken. Four experimental and theoretical requirements that would support the possibility of raising physical metaphors into the realm of potential verification are 1) discovery of KK particles 2) demonstrating theoretically that gravitational standing waves and solitons exist in the "bulk" of the Randall Sundrum theory 3) detecting higher mode gravitational waves originating in the bulk capable of being received by individual human organisms and 4) the identification of a candidate for a specific locus in the human organism of reception and transmission of vibratory effects back and forth from brane to bulk. Below we discuss each of these in detail. Taken together they would constitute necessary but not sufficient conditions for verification.

1. A necessary condition is experimental confirmation of the existence of higher dimensions by the detection of Kaluza-Klein excitation decays in the brane. Because in the theory the bulk is exponentially warped, the KK particles should have a mass on the order of or higher than 10^12 electron volts (Randall, 2005). At the energies to be available at the LHC, confirmation or falsification should be possible.

2. A second requirement would be theoretical confirmation of the possibility of very complex forms of gravitational wave activity in the bulk, involving standing waves, solitons, gravitons and their excitations. In this respect there is a danger of relying too much on physical intuition from our ordinary 4D space-time, since the extra spatial dimension in the 5D bulk can lead to more complexity. For example, there are very powerful methods (such as conformal mapping) for solving certain equations in 3D (2 space

dimensions), and if there is symmetry in the z direction (called axial symmetry) then the added spatial dimension from 3D to 4D space time does not complicate the solutions, and one can use intuition and experience based on the 3D space time. However, in general adding an extra spatial dimension does lead to more complexity. Such would equally be true for the 4D to 5D transition. The potential added complexity of gravitational wave phenomena in the 5D bulk has yet to be investigated.

This second set of requirements will be quite challenging even to the expert general relativist. We have here made a brief foray into this question, but the present paper is limited to a discussion of the possibilities, requirements and issues raised in pursuing the Flatlander analogy in terms of one type of contemporary extra-dimensional theory and does not extend to technical theoretical elaborations along these lines.

It may be objected that it is absurd to imagine that any configuration of purely gravitational field energies in the 5D bulk, however complex, could function as some kind of extension, or organ, of our physical 4D forms. But aside from the point just made (that intuition and experience based on our current paradigm may be inadequate), we submit that our "physical" (i.e. corporeal) bodies are themselves made up of (matter) fields and particles, where the particles are expressions (as quanta) of such fields. It is certainly not clear that this constitutes a radical qualitative difference in the possibilities of organization. Furthermore although the energies making up our own corporeal form are predominantly non-gravitational, they may certainly involve gravitational influences. The reverse case might indeed be made: a complex structure made only of gravitational energies and particles might have capabilities of organization unknown when freed of the presence of the energies constituting "matter," particularly when an additional spatial dimension is a factor. Only more research may determine whether such is a possibility. We note however that this latter point is consistent with the traditional notions of the transcendence of existence beyond the "corporeal."

3. Next, experimental determination of the existence of higher mode gravitational waves originating in the bulk and capable of being received by individual human organisms is required. (Preliminary to this one would first have to detect such received gravitational interactions from the bulk in a passive laboratory setting, without the aid of the LHC!) This would have to include a detailed modeling of gravitational energy exchange mechanisms

between bulk and brane. If we are bound to the assumption of mind-brain identity, this would appear to mean localizing a source of such wave frequencies within the human brain.

The idea of biological quantum coherence phenomena based on vibrational effects within active cells, although not directly related to the brain, has been studied by Frohlich [Frohlich,1968]. He has examined biological systems with branches of longitudinal electric modes at frequencies in the microwave range, based on the dipolar properties of cell membranes. In particular he has shown that if energy is supplied above a certain mean rate to such a branch, then a steady state will be reached in which a single mode of this branch is very strongly excited. What is remarkable is that the supplied energy is not completely thermalized but stored in a highly ordered fashion with long range phase correlations which has considerable similarity with the low-temperature condensation of a Bose gas. This is mentioned just to point out that coherent vibratory effects within the biological system of the brain may not be pure speculation. Penrose (1994) has even suggested that there may be a connection between these microwave frequencies and the much lower measured frequencies associated with alpha, beta, theta, and delta brain wave activity.

In regard to a gravity-brain connection, Penrose (1994) has also claimed that consciousness involves processes that may be intimately tied to large scale quantum-coherent phenomena (including state reduction) in the microtubules associated with the synapses branching off nerve pathways, related to the claims discussed above by Frohlich. And he also proposes that quantum state reduction must ultimately be a gravitational phenomenon in spite of the weak interactions involved. This would appear to support the possibility of the effect of gravitational signals on conscious awareness. However, contrary to some of the speculations of artificial intelligence, Penrose also argues that the way that gravitational mechanisms mediate state reduction cannot be modeled by any computational, i.e., algorithmic, procedure.

Returning now to the problem of the weakness of gravity in regard to consciousness and paranormal phenomena, we point out that even gravitational waves produced by large systems are very weak. The Sun-Jupiter rotational system, for example, produces a power output about that of only a 40 watt bulb. Detecting much, much weaker gravity waves is certainly

impossible with today's detection devices. This, however, does not imply that such extremely weak signals could not have an impact on the gravitational structures in the bulk. There are two reasons. First of all, no matter-based interfering energy transfers to the bulk can take place; and secondly, some form of frequency resonance could be involved. The extremely weak nature of the coupling of the gravitational field to all matter forms (mass or electromagnetic) makes the determination of a viable mechanism of their generation and reception within the brain the most problematic aspect of our analysis. However, as discussed above the two-brane theory of Randall and Sundrum provides an enormous factor of about 1016 in the strength with which gravitational signals originating in the bulk can affect matter particles in the brane. As stated by Randall (2005), the "KK particles pile up on the weak brane (because their probability function peaks there) and they have all the properties of weak brane particles." Here then is another unexplored avenue of theoretical research, the pressing question being whether Randall's statement about the KK particles from the bulk could theoretically translate into them having effects on brains or bodies in the brane.

4. Finally, verification would require a candidate for a specific locus, or organ, of reception and transmission of vibratory effects back and forth from brane to bulk. One candidate region might be the so-called "god spot" which was thought to be a distinct area of the brain responsible for spiritual experiences. Recent research at the University of Missouri has indicated, however, that experiences thought to be associated with a "god spot" are actually a complex phenomenon involving multiple areas of the brain, not just a single location (News Bureau, University of Missouri, April 18, 2012). This observation brings into view recent critiques of the mind-brain identity theory in cognitive science, which argue that no sharp demarcation can be drawn between the brain and the entire nervous system. Whether self-awareness can be associated with any specific areas of the brain is unknown with those both arguing for and against the localization hypothesis.

There is also the consideration that mediums and clairvoyants make claims of perceiving information from other dimensions or planes of existence, such as the "astral plane," and also of perceiving one or more spiritual "bodies" of individuals which exist in other such planes or levels of reality. If there were some experimental determination, again, of an organ or region of the body possessed by, or more highly developed in, such individuals, this could also

be a candidate for such a focus of reception and transmission between brane and bulk.

Some in the field of cognitive science have proposed a theory of "extended cognition" which attributes mental phenomena to an even larger spatiotemporal structure called a behavioral field which, it is proposed, may be described by Dynamic Systems Theory (DST) (Rockwell, 2007, Chemero 2009). Under such a theory, any source of gravitational forms which might serve as a basis for energy exchange between humans in the brane and gravitational structures in the bulk would be a complex dynamic spatiotemporal field of activity. As such, this latter would perhaps be a more likely source than any single dedicated area of the brain. Such concerns, however, are at the cutting edge of mind-brain research and at present no experiments have been devised or proposed which might detect weak gravitational waves associated with human mental activity, whether localized in the brain or extended to the nervous system or beyond. In fact, although it may be nearly impossible to detect gravity waves in the brain associated with zero mode gravitons from the brane or bulk it remains an open question whether the same could be said for the higher mode excitations from the bulk.

5 Conclusion

Our aim has been limited to an investigation of how the extra-dimensional theory of Randall and Sundrum might apply to an extension of the 3D-4D Flatlander case, by analogy, to a 4D-5D situation. Specifically the theory being investigated is that 5D gravity-based structures in the bulk are non-corporeal but physical extensions (as defined above) of the bodies of 4D individuals in the brane and are engaged in energy exchanges with human individuals, as this updated analogue to the Flatlander case suggests. The requirement of the analogy is that evidence should either be found, or experiments proposed, which might indicate that our personal consciousness may be divided in some way between corporeal forms in the embedded 4D realm and non-corporeal (gravitational) forms in the larger 5D realm, of which (in the Randall-Sundrum model) our 4D space-time constitutes a boundary called a brane. Following up on our detailed exploration of this topic, we identified four experimental and theoretical results whose confirmation would constitute necessary, but not sufficient, conditions for

verification of such a theory. Our conclusion, then, is that although the Randall-Sundrum extra-dimensional model is suggestive of that possibility, actual verification of the extension of the Flatlander analogy at the 4D-5D level does not appear to be within the purview of contemporary experimental capability. On the other hand, given the existence of the various possibilities mentioned, the analogy cannot be rejected out of hand as absolutely unverifiable but that the question of what would constitute sufficient conditions remains open.

Acknowledgments The authors would like to thank Dr. Conley Powell and Dr. James Strange for helpful comments on a preliminary version of the paper, to Mr. David Menard for pointing out to us the work of Carr, and to Natallia Kaptur for graphical support on the figures.

REFERENCES

Arkani-Hamed, N., Dimopoulos, S. and Dvali, G Phys. Lett. B429 (1998) 263,hep-ph/9803315.

Antoniadis, I., Arkani-Hamed, N., Dimopoulos, S., and Dvali, G., Phys. Lett. B436 (1998) 257, hep-ph/9804398

Bizon, P. et al (2007) Class.Quant.Grav.24:4751-4776.

Braude, S., "Memory Without a Trace" (2006), European Journal of Parapsychology Volume 21.2, Special Issue, pages 182–202 ISSN: 0168-7263

Carr, B., (2008), "Worlds Apart: Can Psychical Research Bridge the Gulf Between Matter and Mind" Proceedings of the Society for Psychical Research, 59, Part 221.

Chemero, A. (2009). Radical Embodied Cognitive Science. Cambridge, MA: MIT Press, A Bradford Book.

CMS Collaboration, 2011) Phys. Lett. B 697, 434.

Chatrchyan, S. et al. (2012), [CMS Collaboration], JHEP 1204, 061 (2012) [arXiv:1202.639]

Fairvre, quoted in Hanegraaff, W. J. (1998). New Age religion and Western culture: Esotericism in the mirror of secular thought. State University of New York Press.,pp. 398-9.

Frohlich, H., (1968), "Long Range Coherence and Energy Storage in

Biological Systems" Journal of Quantum Chemsitry, Vol II, 641-49.

Goodrick-Clarke, N. (2008), The Western Esoteric Traditions, Oxford University Press.

Govinda, Anagarika, (1974) Foundations of Tibetan Mysticism, Samuel Weiser, N. Y.

Green, Michael and Schwarz John, (1984) "Anomaly Cancellations in Supersymmetric D=10 Gauge Theory and Superstring Theory", Physics Letters B149 pp. 117–22.

Heindel, Max, , (1929) Rosicrucian Cosmo-Conception, Rosicrucian Fellowship. Jung, C. G., (1968), Analytical Psychology, Its Theory and Practice, Random House, Vintage Books.

Jung, C. G., (1981) The Structure and Dynamics of the Psyche, Princeton University Press , Bollingen Series Volume 8, (fifth printing of the 1960 first edition).

Kaku, Michio, (1994) Hyperspace: A Scientific Odyssey Through Parallel Universes, Time Warps, and the Tenth Dimension, Oxford University Press.

Kaluza, Theodor (1921). "Zum Unitätsproblem in der Physik". Sitzungsber. Preuss. Akad. Wiss. Berlin. (Math. Phys.) 966–972.

Kant, I., (1961) The Critique of Pure Reason. MacMillan, London. Translation by Norman Kent Smith of the original 1787 edition.

Klein, Oskar (1926). "Quantentheorie und fünfdimensionale Relativitätstheorie". Zeitschrift für Physik A 37 (12): 895–906.

Landsberg, G. ,(2006), Black Holes at Future Colliders and Beyond: a Topical Review, Phys.G32:R337-R365.

McDaniel, S. V. (2010). Review of Consciousness and Its Objects by Colin McGinn. Journal of Scientific Exploration 24(4), 756-765.

McGinn, Colin, (2004) Consciousness and its Objects. Clarendon Press.

Mitchell, Edgar, (2001), Nature's Mind: The Quantum Hologram. Institute of Noetic Sciences, Lake Worth, FL.

Penrose, Roger, (1994), Shadows of the Mind – A Search for the Missing Science of Consciousness, Oxford University Press.

Randall, L. and Sundrum, R. (1999), Phys. Rev. Lett. 83,3370 [arXiv:hep-ph/9905221].

Randall, Lisa, (2005), Warped Passages: Unraveling the Mysteries of the Universe's Hidden Dimensions. Harper-Perennial.

Rockwell, W. T. (2007). Neither Brain Nor Ghost: A Non-Dualist

Alternative to the Mind–Brain Identity Theory. Cambridge, MA: MIT Press, A Bradford Book.

Rothman, T. and Boughn, S. (2006), Foundations of Physics, Vol 36, 1801-1825 [arXiv:grqc/0601043]

Schwenk, T, (1996), Sensitive Chaos: The Creation of Flowing Forms in Water and Air, Rudolf Steiner Press, revised edition.

Stephani, H., (2003), General Relativity and Gravitation, Volume 35, Number 3, pp. 467-474(8).

Weiss, B. L. and Weiss, A. E. Weiss (2012) , Miracles Happen, HarperOne.

Weiss, B. (1988), Many Lives, Many Masters. Simon and Schuster, Zwiebach, Barton (2004), A First Course in String Theory, Cambridge

13. Cosmological Implications of Near-Death Experiences

Bruce Greyson
University of Virginia, University of Virginia Health System, 210 10th Street, NE, Suite 100, Charlottesville, VA 22902-4754

Abstract

"Near-death experiences" include phenomena that challenge materialist reductionism, such as enhanced mentation and memory during cerebral impairment, accurate perceptions from a perspective outside the body, and reported visions of deceased persons, including those not previously known to be deceased. Complex consciousness, including cognition, perception, and memory, under conditions such as cardiac arrest and general anesthesia, when it cannot be associated with normal brain function, requires a revised cosmology anchored not in 19th-century classical physics but rather in 21st-century quantum physics that includes consciousness in its conceptual formulation. Classical physics, anchored in materialist reductionism, offered adequate descriptions of everyday mechanics but ultimately proved insufficient for describing the mechanics of extremely high speeds or small sizes, and was supplemented a century ago by quantum physics. Materialist psychology, modeled on the reductionism of classical physics, likewise offered adequate descriptions of everyday mental functioning but ultimately proved insufficient for describing mentation under extreme conditions, such

as the continuation of mental function when the brain is inactive or impaired, such as occurs near death.

KEY WORDS: materialism, reductionism, near-death experience, mind-body problem, consciousness

1. Introduction to Near-death Experiences

Many but not all neuroscientists, physicists, and psychologists believe the mind and consciousness are produced by, or are subjective concomitants of, brain states (Crick, 1994; Damasio & Meyer, 2009; Searle, 2000). This theory receives considerable support from the correlation between brain changes and mental changes: inhibiting brain activity generally inhibits mental activity (Churchland, 1986; Jeeves & Brown, 2009; Tononi & Laurys, 2009). However, correlation is not the same as causation. For example, it is well established that the frontal lobes control or mediate perceptual and other cognitive activities through inhibition (Joseph 1988, 1999a). It is in this manner that concentration and attention may be maintained, so that the mind remains focused. On the other hand, it is also well established that injuries to specific regions of the brain disrupt various aspects of consciousness and mental activity, including thinking, speech, and awareness of the body image (Joseph 1986, 1996, 1999b).

Thus the production model posits that the brain generates the mind (Churchland, 1986; Crick, 1994; Searle, 2000), whereas the filter or transmission model posits that the brain may permit or mediate the mind (Broad, 1953; Burt, 1968; Huxley, 1954; James, 1898; Kelly, 2007; Schiller, 1891). By contrast, the evidence compiled by Joseph (1996, 1999b, 2001) could be said to support both views. Likewise, it is the opinion of this author that the observed correlation between brain states and mind states is compatible with the "production" theory that mind is produced by the brain, but it is also compatible with the "filter" or "transmission" theory that the mind is filtered, focused, limited, constrained, or received by the brain; i.e. that the brain may be a vehicle which receives, transports, and transmits, but is not synonymous with the mind. These and other models of the brain-mind relationship have been debated for centuries, with discussions appearing even in the Platonic dialogues (Kelly, 2007).

One major clue to the nature of the mind-brain relationship may be found in descriptions of near-death, or after death experiences. If the mind, if

consciousness is retained during clinical death, this would indicate the mind may only be dependent on the brain much as a radio transmission is dependent upon a receiver and broadcast unit.

Dozens of case reports in the medical literature spanning centuries have documented the phenomenon of "terminal lucidity," the unexplained return of mental clarity and memory shortly before death in patients who had suffered years of chronic schizophrenia or dementia (Brierre de Boismont, 1862; Burdach, 1826; Marshall, 1815; Nahm & Greyson, 2009; Turetskaia & Romanenko, 1975). Beyond this paradoxical enhanced mental clarity while brain function deteriorates, considerable research in the past several decades has delineated parameters of what have come to be called "near-death experiences", where those who appear to have died report dissociative experiences where they are separate from their bodies and can observe and are conscious of their surroundings. These profound subjective experiences that many people report when they are near death pose challenges to the materialist mind-brain production model (Greyson, 2003; Parnia et al., 2001; Schwartz et al., 2005; van Lommel et al., 2001).

Experiences of heightened or mystical consciousness on the threshold of death have been described sporadically in the Western medical literature since the 19th century and have been studied systematically for the past 30 years (Holden et al., 2009). Recent research suggests that near-death experiences (NDEs) are reported by 12% to 18% of cardiac arrest survivors (Parnia et al., 2001; Greyson, 2003; van Lommel et al., 2001). These near-death experiences include feelings of peace and joy; a sense of being out of one's physical body and watching events from an out-of-body perspective; a cessation of pain; seeing an unusually bright light, sometimes experienced as a "Being of Light" that radiates love and may speak or otherwise communicate with the person; encountering other beings, often deceased people; experiencing a revival of memories or even a full life review, seeing some "other realm," often of great beauty; sensing a barrier or border beyond which the person cannot go; and returning to the physical body, often reluctantly.

A number of hypotheses have been proposed to explain NDEs within the mind-brain production theory, attributing them to psychopathology (Noyes & Kletti, 1976; Pfister, 1930), unique personality traits (Gow, Lane, & Chant, 2003; Lynn & Rhue, 1988), altered blood gases (Whinnery, 1997),

neurotoxic metabolic reactions (Carr, 1982; Jansen, 1997), or alterations in brain activity (Morse, Venecia, & Milstein, 1989; Saavedra-Aguilar & Gómez-Jeria, 1989).

Joseph (1996, 1999b, 2001), for example, has provided considerable data of near-death like dissociative experiences following abnormal activation or electrode stimulation of temporal lobe structures which include the amygdala and the hippocampus. According to Joseph, these latter structures play important roles in emotional and cognitive memory, and may explain the "life review"; the phenomenon where victims see their "life flash before their eyes." He also argues that since the hippocampus and overlying temporal lobe structures are involved in vision, the cognitive mapping of the visual environment, and the processing of the upper visual field, they may contribute to the dissociative experience of floating above the body during near death and when these structures are activated by electrode. Although he raises the possibility these are hallucinations, he also reports on those who died and who were able to correctly described their surroundings including doctors and nurses who attended to them while they were dead.

Although the theories and evidence provided by Joseph (1996, 1999b, 2001a) and others is intriguing, they only provide empirical support and address only selected aspects of the phenomena (Greyson et al., 2009). The most important objection to the adequacy of all such reductionistic hypotheses is that mental clarity, vivid sensory imagery, a clear memory of the experience, and a conviction that the experience seemed more real than ordinary consciousness are the norm for NDEs. They occur even in conditions of drastically altered cerebral physiology under which the production theory would deem consciousness impossible.

2. Physiology of General Anesthesia and Cardiac Arrest

NDEs are typically triggered when patients are clinically near death, such as following catastrophic physical traumas, or during cardiac arrest or some other, usually sudden, loss of vital functions. In one study of 1595 consecutive admissions to a cardiac care unit, NDEs were reported 10 times more often by patients who had survived definite cardiac arrest than by patients with other serious cardiac incidents (Greyson, 2003). The incompatibility of NDEs with the mind-brain production theory is particularly evident in connection with experiences that occur under two

conditions, namely, general anesthesia and cardiac arrest.

In our collection at the University of Virginia, 22% of our NDE cases occurred under anesthesia, and they include the same features as other NDEs, such as out-of-body experiences that involved watching medical personnel working on the body, an unusually bright or vivid light, meeting deceased persons, and thoughts, memories, and sensations that were clearer than usual.

John et al. (2001) identified reliable electroencephalographic (EEG) correlates of loss and recovery of consciousness during general anesthesia. Their results confirmed the standard thinking about anesthesia and EEG, namely, that unconsciousness is associated with a profound reduction in brain activity under anesthesia. Additional results supportive of this conclusion derive from other recent functional imaging studies that have looked at blood flow, glucose metabolism, or other indicators of cerebral activity under general anesthesia (Alkire, 1998; Alkire et al., 2000; Shulman et al., 2003; White & Alkire, 2003). In these studies, brain areas essential to the global workspace are consistently greatly reduced in activity individually and may be decoupled functionally, thereby providing considerable evidence against the possibility that the anesthetized brain could produce clear thinking, perception, or memory.

The situation is even more dramatic with regard to NDEs occurring during cardiac arrest, many of which in fact occur also in conjunction with major surgical procedures involving general anesthesia. In four published studies alone, more than 100 cases of NDEs occurring during cardiac arrest were reported (Greyson, 2003; Parnia et al., 2001; Sabom, 1982; van Lommel et al., 2001). Like NDEs that occur with general anesthesia, those that occur in connection with cardiac arrest include the typical features associated with NDEs, including enhanced sensation and mentation, out-of-body experiences, and visions of deceased acquaintances.

However, in cardiac arrest, cerebral functioning shuts down within a few seconds. With circulatory arrest, blood flow and oxygen uptake in the brain plunge to near-zero levels. EEG signs of cerebral ischemia are detectable within 6-10 seconds, and progress to isoelectricity (flat-line EEGs) within 10-20 seconds (DeVries et al., 1998; Vriens et al., 1996). In sum, full arrest leads rapidly to the three major clinical signs of death: absence of cardiac output, absence of respiration, and absence of brainstem reflexes (Parnia & Fenwick, 2002; van Lommel et al., 2001).

Defenders of the mind-brain production theory might object that even in the presence of a flat-lined EEG there still could be undetected brain activity going on; current scalp-EEG technology detects only activity common to large populations of neurons, mainly in the cerebral cortex. However, the issue is not whether there is brain activity of any kind whatsoever, but whether there is brain activity of the specific form agreed upon by contemporary neuroscientists as the necessary condition of conscious experience. Activity of this form is eminently detectable by current EEG technology, and it is abolished either by general anesthesia or by cardiac arrest.

In cardiac arrest, even neuronal action-potentials, the ultimate physical basis for coordination of neural activity between widely separated brain regions, are rapidly abolished (Kelly et al., 2007). Moreover, cells in the hippocampus, the region thought to be essential for memory formation, are especially vulnerable to the effects of anoxia (Vriens et al., 1996). In short, it is not credible to suppose that NDEs occurring under conditions of general anesthesia, let alone cardiac arrest, can be accounted for in terms of some hypothetical residual capacity of the brain to process and store complex information under those conditions.

A second defense of the mind-brain production theory for NDEs is to suggest that these experiences do not occur during the actual episodes of brain insult, but before or just after the insult, when the brain is more or less functional (Augustine, 2007; Rodabaugh, 1985).

However, unconsciousness produced by cardiac arrest characteristically leaves patients amnesic and confused for events immediately precededing and following these episodes (Aminoff et al., 1988; Parnia & Fenwick, 2002; van Lommel et al., 2001). Furthermore, a substantial number of NDEs contain apparent time "anchors" in the form of verifiable reports of events occurring during the period of insult itself. For example, a cardiac-arrest victim described by van Lommel et al. (2001) had been discovered lying in a meadow 30 minutes or more prior to his arrival at the emergency room, comatose and cyanotic, and yet days later, having recovered, he was able to describe accurately various circumstances occurring in conjunction with the ensuing resuscitation procedures in the hospital.

3. Relevance of Near-Death Experiences to Cosmology

Until the early 20th century, it was plausible to base a scientific cosmology on materialist reductionism, the idea that any complex phenomenon could be understood by reducing it to its individual components, and eventually down to elementary material particles. This worldview implied that all complex psychological phenomena could ultimately be understood in material terms. This materialist cosmology influenced psychology as it did other sciences, even though this reductionism required mainstream academic psychologists to ignore consciousness as the subject was viewed as "not scientific." Materialist psychology was epitomized by Watson, who asserted: "Psychology, as the behaviorist views it, is a purely objective, experimental branch of natural science which needs consciousness as little as do the sciences of chemistry and physics" (1914, p. 27). However, while Watson was aligning behaviorist psychology with classical mechanics, physicists were already moving beyond that model with a quantum physics that could not be formulated without reference to consciousness.

Classical dynamics adequately described the motion of macroscopic objects moving at everyday speeds; it was only the investigation of extraordinary circumstances, involving objects moving with velocities approaching the speed of light or the behavior of microscopic wave-particles, that revealed the limits of the classical model and the need for additional explanatory paradigms. So too with the question of the mind-brain relationship: it is the exploration of extraordinary circumstances of mental function that reveal the limitations of the production theory and the need for a more comprehensive theory of mind-brain interaction.

4. Near-Death Experiences and the Mind-Brain Production Theory

Although many 20th-century physicists, psychologists and neuroscientists accepted the reductionistic model that brain produces mind, or indeed is the mind (Churchland, 1986; Crick, 1994; Damasio, 1999; Pinker, 1997), several features of NDEs call into question whether materialist reductionism will ever provide a full explanation of mind, including and most notably enhanced mental processes, accurate out-of-body perception, and visions of deceased relatives and close friends (Greyson, 2010a).

Perhaps the most important of these features, because it is so commonly reported in NDEs, is the occurrence of enhanced mental activity at times when, according to the mind-brain production model, such activity should be

diminishing, if not impossible. Individuals reporting NDEs often describe their mental processes during the NDE as remarkably clear and lucid and their sensory experiences as unusually vivid, surpassing those of their normal waking state.

A recent analysis of several hundred NDE cases showed that 80% of experiencers described their thinking during the NDE as "clearer than usual" or "as clear as usual" (Kelly et al., 2007, p. 386). An analysis of the medical records of people reporting NDEs showed that, in fact, people reported enhanced mental functioning significantly more often when they were actually physiologically close to death than when they were not (Owens et al., 1990).

An example of enhanced mental functioning during an NDE is a rapid revival of memories that sometimes extends over the person's entire life. An analysis of several hundred NDEs showed that in 24% of them there was a revival of memories during the NDE (Kelly et al., 2007, p. 386). Moreover, in contrast to the isolated and often just single brief memories evoked during cortical stimulation, memories revived during an NDE are frequently described as an almost instantaneous "panoramic" review of the person's entire life (Noyes & Kletti, 1977; Stevenson & Cook, 1995).

Another important feature of NDEs that the mind-brain production theory cannot adequately account for is the experience of being out of the body and perceiving events that one could not ordinarily have perceived. A recent analysis of several hundred cases showed that 48% of near-death experiencers reported seeing their physical bodies from a different visual perspective. Many of them also reported witnessing events going on in the vicinity of their body, such as the attempts of medical personnel to resuscitate them (Kelly et al., 2007). The mind-brain production theory could attribute the belief that one has witnessed events going on around one's body to a retrospective imaginative reconstruction based on a persisting ability to hear, even when unconscious, or to the memory of objects or events that one might have glimpsed just before losing consciousness or while regaining consciousness, or to expectations about what was likely to have occurred (Saavedra-Aguilar & Gómez-Jeria, 1989; Woerlee, 2004).

Such explanations are inadequate, however, for several reasons. First, memory of events occurring just before or after loss of consciousness is usually confused or completely absent (Aminoff et al., 1988; Parnia &

Fenwick, 2002; van Lommel et al., 2001). Second, anecdotal reports that adequately anesthetized patients retain a significant capacity to be aware of or respond to their environment in more than rudimentary ways—let alone to hear and understand—have not been substantiated by controlled studies (Ghoneim & Block, 1992, 1997).

The phenomenology of awakenings under anesthesia is altogether different from that of NDEs, and often extremely unpleasant, frightening, and even painful, typically brief and fragmentary, and primarily auditory or tactile, but not visual (Osterman et al., 2001; Spitellie et al., 2002). There is no convincing evidence that memories of complex sensory experiences occurring during general anesthesia could have been acquired by the impaired brain itself during the period of unconsciousness.

Furthermore, any such explanatory claims are even less credible when, as commonly happens, the specific sensory channels involved in the reported experience have been blocked as part of the surgical routine—for example, when visual experiences are reported by patients whose eyes were taped shut during the relevant period of time.

Sabom (1982) carried out a study specifically to examine whether claims of out-of-body perceptions could be attributed to retrospective reconstruction. He interviewed patients who reported NDEs in which they seemed to be watching what was going on around their body, most of them cardiac patients who were undergoing cardiopulmonary resuscitation (CPR) at the time of their NDE. He also interviewed "seasoned cardiac patients" who had not had an NDE during their cardiac-related crises, and asked them to describe a cardiac resuscitation procedure as if they were watching from a third-person perspective. He found that 80% of the comparison patients made at least one major error in their descriptions, whereas none of the NDE patients made any (pp. 87–115). Sartori (2008) recently replicated Sabom's findings in a five-year study of hospitalized intensive care patients, in which patients who reported leaving their bodies during cardiac arrests described their resuscitations accurately, whereas every cardiac arrest survivor who had not reported leaving the body described incorrect equipment and procedures when asked to describe their resuscitation.

An even more difficult challenge to the mind-brain production theory comes from NDEs in which experiencers report that, while out of the body, they became aware of events occurring at a distance or that in some other

way would have been beyond the reach of their ordinary senses even if they had been fully and normally conscious. Clark (1984) and Owens (1995) each published a case of this type, and we have reported on 15 cases, including seven cases previously published by others and eight from our own collection (Cook et al., 1998; Kelly et al., 2000), including accurate perceptions of highly unexpected or unlikely details. Additionally, Ring and Cooper (1997, 1999) reported 31 cases of blind individuals, nearly half of them blind from birth, who experienced during their NDEs quasi-visual and sometimes veridical perceptions of objects and events. One criticism of these reports of perception of events at a distance from the body is that they often depend on the experiencer's testimony alone. However, many cases have in fact been corroborated by independent witnesses (Clark, 1984; Hart, 1954; Ring & Lawrence, 1993; van Lommel et al., 2001; Cook et al., 1998).

In a recent review of 93 published reports of potentially verifiable out-of-body perceptions during NDEs, Holden (2009) found that 43% had been corroborated to the investigator by an independent informant, an additional 43% had been reported by the experiencer to have been corroborated by an independent informant who was no longer available to be interviewed by the investigator, and only 14% relied solely on the experiencer's report. Of these out-of-body perceptions, 92% were completely accurate, 6% contained some error, and only 1% was completely erroneous. Even among those cases corroborated to the investigator by an independent informant, 88% were completely accurate, 10% contained some error, and 3% were completely erroneous. The cumulative weight of these cases is inconsistent with the conception that purported out-of-body perceptions are nothing more than hallucinations.

Many people who approach death and recover report that, during the time they seemed to be dying, they met deceased relatives and friends (Cook et al., 1998; Kelly et al, 2000; Osis & Haraldsson, 1977). In a recent analysis of several hundred NDEs, 42% of experiencers reported meeting one or more recognizable deceased acquaintances during the NDE (Kelly, 2001). In the mind-brain production theory, such experiences are widely viewed as being hallucinations, caused by drugs or other physiological conditions or by the person's expectations or wishes to be reunited with deceased loved ones at the time of death. However, a closer examination of these experiences indicates that such explanations are not adequate.

People close to death are more likely to perceive deceased persons than are people who are not close to death: the latter, when they have waking hallucinations, are more likely to report seeing living persons (Osis & Haraldsson, 1977). For example, Whinnery (1997) reported that healthy fighter pilots exposed to acceleration-induced anoxia to the point of loss of consciousness (G-LOC) typically report hallucinations of living friends and family. One 20-year-old pilot reported his G-LOC experience: "I was home . . . saw my mom and my brother. . . . I got to go home [by dreaming] without taking [military] leave!" (Whinnery, 1997, p. 245; brackets in original). Near-death experiencers whose medical records show that they really were close to death also were more likely to perceive deceased persons than experiencers who were ill but not close to death, even though many of the latter thought they were dying (Kelly, 2001).

People more often perceive deceased individuals with whom they were emotionally close, but in one-third of the cases the deceased person was either someone with whom the experiencer had a distant or even poor relationship or someone whom the experiencer had never met, such as a relative who died long before the experiencer's birth (Kelly, 2001). Van Lommel (2004, p. 122) reported the case of a man who had an NDE during cardiac arrest in which he saw his deceased grandmother and an unknown man. Later shown a picture of his biological father, whom he had never known and who had died years ago, he immediately recognized him as the man he had seen in his NDE.

There is one particular kind of vision of the deceased that calls into question even more directly their dismissal as subjective hallucinations: cases in which the dying person apparently sees, and often expresses surprise at seeing, a person whom he or she thought was living, who had in fact recently died. Reports of such cases were published in the 19th century (Cobbe, 1882; Gurney & Myers, 1889; Johnson, 1899; Sidgwick, 1885) and have continued to be reported in recent years (Greyson, 2010b; Osis & Haraldsson, 1977; Sartori, 2008; van Lommel, 2004). In one recent case, a 9-year-old boy with meningitis, upon awakening from a 36-hour coma, told his parents he had been with his deceased grandfather, aunt, and uncle, and also with his 19-year-old sister who was, as far as his family knew, alive and well at college 500 miles away. Later that day, his parents received news from the college that their daughter had died in an automobile accident early that morning

(Greyson, 2010b). Because in these cases the experiencers had no knowledge of the death of recently deceased person, the vision cannot plausibly be attributed to the experiencer's expectations.

5. Conclusion

In sum, the challenge of NDEs to the mind-brain production theory lies in asking how complex consciousness, including mentation, sensory perception, and memory, can occur under conditions in which current neurophysiological models deem it impossible. This conflict between a materialist model of brain producing mind and the occurrence of NDEs under conditions of general anesthesia and/or cardiac arrest is profound and inescapable. Only when we expand models of mind to accommodate extraordinary experiences such as NDEs will we progress in our understanding of consciousness and its relation to brain. The predominant contemporary models of consciousness are based on principles of classical physics that were shown to be incomplete in the early decades of the 20th century. However, the development of post-classical physics over the past century offers empirical support for a new scientific conceptualization of the interface between mind and brain compatible with a cosmology in which consciousness is a fundamental element (Schwartz et al., 2005; Stapp, 2007).

References

Alkire, M. T. (1998). Quantitative EEG correlations with brain glucose metabolic rate during anesthesia in volunteers. Anesthesiol, 89, 323-333.

Alkire, M. T., Haier, R. J., & Fallon, J. H. (2000). Toward a unified theory of narcosis. Consciousness & Cognition, 9, 370-386.

Aminoff, M. J., Scheinman, M. M., Griffin, J. C., & Herre, J. M. (1988). Electrocerebral accompaniments of syncope associated with malignant ventricular arrhythmias. Ann Int Med, 108, 791-796.

Augustine, K. (2007). Does paranormal perception occur in near-death experiences? J Near-Death Stud, 25, 203-236.

Brierre de Boismont, A. (1862). Des hallucinations. Paris: Germer Baillière.

Broad, C. D. (1953). Religion, philosophy, and psychical research. New York: Harcourt Brace.

Burdach, K. F. (1826). Vom Baue und Leben des Gehirns, Vol. 3. Leipzig: Dyk'sche Buchhandlung.

Burt, C. (1968). Psychology and psychical research. London: Society for Psychical Research.

Carr, D. (1982). Pathophysiology of stress-induced limbic lobe dysfunction: A hypothesis for NDEs. J Near-Death Stud, 2, 75-89.

Churchland, P. S. (1986). Neurophilosophy: Toward a unified science of the mind/brain. Cambridge, MA: MIT Press.

Clark, K. (1984). Clinical interventions with near-death experiencers. In B. Greyson & C. P. Flynn (Eds.), The near-death experience (pp. 242-255). Springfield, IL: Charles C Thomas.

Cobbe, F. P. (1882). The peak in Darien. Boston: George H. Ellis.

Cook, E. W., Greyson, B., & Stevenson, I. (1998). Do any near-death experiences provide evidence for the survival of human personality after death? J Sci Exploration, 12, 377-406.

Crick, F. (1994). The astonishing hypothesis: The scientific search for the soul. London: Simon & Schuster.

Damasio, A. (1999). How the brain creates the mind. Sci Amer, 281, 112 – 117.

Damasio, A., & Meyer, K. (2009). Consciousness: An overview of the phenomenon and of its possible neural basis. In S. Laurys & G. Tononi (Eds.), The neurology of consciousness: Cognitive neuroscience and neuropathology (pp. 3-14). Amsterdam: Elsevier.

DeVries, J. W., Bakker, P. F. A., Visser, G. H., Diephuis, J. C., & van Huffelin, A. C. (1998). Changes in cerebral oxygen uptake and cerebral electrical activity during defibrillation threshold testing. Anesthesiol Analgesia, 87, 16-20.

Ghoneim, M. M., & Block, R. I. (1992). Learning and consciousness during general anesthesia. Anesthesiol, 76, 279-305.

Ghoneim, M. M., & Block, R. I. (1997).Learning and memory during general anesthesia. 18 Anesthesiol, 87, 378-410.

Gow, K., Lane, A., & Chant, D. (2003). Personality characteristics, beliefs, and the near-death experience. Austral J Clin Exper Hypn, 31, 128-152.

Greyson, B. (2003). Incidence and correlates of near-death experiences in a cardiac care unit. Gen Hosp Psychiatry, 25, 269-276.

Greyson, B. (2010a). Implications of near-death experiences for a postmaterialist psychology. Psychol Relig Spirituality, 2, 37-45.

Greyson, B. (2010b). Seeing deceased persons not known to have died: "Peak in Darien" experiences. Anthropology & Humanism, 35, 159-171.

Greyson, B., Kelly, E. W., & Kelly, E. F. (2009). Explanatory models for near-death experiences. In J. M. Holden, B Greyson, & D. James (Eds.), The handbook of near-death experiences (pp. 213-234). Santa Barbara, CA: Praeger/ABC-CLIO.

Gurney, E., & Myers, F. W. H. (1889). On apparitions occurring soon after death. Proc Soc Psychical Res, 5, 403-485.

Hart, H. (1954). ESP projection. J Amer Soc Psychical Res, 48, 121-146.

Holden, J. M. (2009). Veridical perception in near-death experiences. In J. M. Holden, B Greyson, & D. James (Eds.), The handbook of near-death experiences (pp. 185-211). Santa Barbara, CA: Praeger/ABC-CLIO.

Holden, J. M., Greyson, B., & James, D. (Eds.). (2009). The handbook of near-death experiences. Santa Barbara, CA: Praeger/ABC-CLIO.

Huxley, A. (1954). The doors of perception. London: Chatto & Windus.

James, W. (1898). Human immortality: Two supposed objections to the doctrine. Boston: Houghton Mifflin.

Jansen, K. L. R. (1997). The ketamine model of the near-death experience: A central role for the N-methyl-D-aspartate receptor. J Near-Death Stud, 16, 5-26.

Jeeves, M., & Brown, W. S. (2009). Neuroscience, psychology, and religion: Illusions, delusions, and realities about human nature. West Conshohocken, PA: Templeton Foundation Press.

John, E. R., Prichep, L. S., Kox, W., Valdés-Sosa, P., Bosch-Bayard, J., Aubert, E., Tom, M., diMichele, F., & Gugino, L. D. (2001). Invariant reversible QEEG effects of anesthetics. Consciousness & Cognition, 10, 165-183.

Johnson, A. (1899). Coincidences. Proc Soc Psychical Res, 14, 158-330.

Joseph, R. (1986). Confabulation and delusional denial: Frontal lobe and lateralized influences. Journal of Clinical Psychology, 42, 845-860.

Joseph, R. (1996). Neuropsychiatry, Neuropsychology, Clinical Neuroscience, 2nd Edition. Williams & Wilkins, Baltimore.

Joseph, R. (1999a). Frontal lobe psychopathology: Mania, depression, aphasia, confabulation, catatonia, perseveration, obsessive compulsions, schizophrenia. Psychiatry, 62, 138-172.

Joseph, R. (1999b). The neurology of traumatic "dissociative" amnesia. Commentary and literature review. Child Abuse & Neglect. 23, 715-727.

Joseph, R. (2001). The Limbic System and the Soul: Evolution and the Neuroanatomy of Religious Experience. Zygon, the Journal of Religion & Science, 36, 105-136.

Kelly, E. F. (2007). A view from the mainstream: Contemporary cognitive neuroscience and the consciousness debates. In E. F. Kelly, E. W. Kelly, A. Crabtree, A. Gauld, M. Grosso, & B. Greyson, Irreducible mind (pp. 1-46). Lanham, MD: Rowman & Littlefield.

Kelly, E. W. (2001). Near-death experiences with reports of meeting deceased people. Death Stud, 25, 229-249.

Kelly, E. W., Greyson, B., & Kelly, E. F. (2007). Unusual experiences near death and related phenomena. In E. F. Kelly, E. W. Kelly, A. Crabtree, A. Gauld, M. Grosso, & B. Greyson, Irreducible mind (pp. 367-421). Lanham, MD: Rowman & Littlefield.

Kelly, E. W., Greyson, B., & Stevenson, I. (2000). Can experiences near death furnish evidence of life after death? Omega, 40, 513-519.

Lynn, S., & Rhue, J. (1988). Fantasy proneness: Hypnosis, developmental antecedents, and psychopathology. Amer Psychologist, 43, 35-44.

Marshall, A. (1815). The morbid anatomy of the brain in mania and hydrophobia. London: Longman.

Morse, M. L. Venecia, D., & Milstein, J. (1989). Near-death experiences: A neurophysiological explanatory model. J Near-Death Stud, 8, 45-53.

Nahm, N., & Greyson, B. (2009). Terminal lucidity in patients with chronic schizophrenia and dementia: A survey of the literature. J Nerv Ment Dis, 197, 942-944.

Noyes, R., & Kletti, R. (1976). Depersonalization in the face of life-threatening danger: An interpretation. Omega, 7, 103-114.

Noyes, R., & Kletti, R. (1977). Panoramic memory: A response to the threat of death. Omega, 8, 181-194.

Osis, K., & Haraldsson, E. (1977). At the hour of death (3rd ed.). New York: Avon.

Osterman, J. E., Hopper, J., Heran, W. J., Keane, T. M., & van der Kolk,

B. A. (2001). Awareness under anesthesia and the development of posttraumatic stress disorder. Gen Hosp Psychiatry, 23, 198-204.

Owens, J. E. (1995). Paranormal reports from a study of near-death experience and a case of an unusual near-death vision. In L. Coly & J. D. S. McMahon (Eds.), Parapsychology and thanatology (pp. 149-167). New York: Parapsychology Foundation.

Owens, J. E., Cook, E. W., & Stevenson, I. (1990). Features of "near-death experience" in relation to whether or not patients were near death. Lancet, 336, 1175-1177.

Parnia, S., & Fenwick, P. (2002). Near death experiences in cardiac arrest. Resuscitation, 52, 5-11.

Parnia, S., Waller, D. G., Yeates, R., & Fenwick, P. (2001). A qualitative and quantitative study of the incidence, features and aetiology of near death experiences in cardiac arrest survivors. Resuscitation, 48, 149-156.

Pfister, O. (1930). Shockdenken und Shockphantasien bei höchster Todesgefahr. Internat Zeitschr Psychoanalyse, 16, 430-455.

Pinker, S. (1997). How the mind works. New York: Norton.

Ring, K., & Cooper, S. (1997). Near-death and out-of-body experiences in the blind: A study of apparent eyeless vision. J Near-Death Stud, 16, 101-147.

Ring, K., & Cooper, S. (1999). Mindsight: Near-death and out-of-body experiences in the blind. Palo Alto, CA: William James Center/Institute of Transpersonal Psychology.

Ring, K., & Lawrence, M. (1993). Further evidence for veridical perception during near-death experiences. J Near-Death Stud, 11, 223-229.

Rodabaugh, T. (1985). Near-death experiences: An examination of the supporting data and alternative explanations. Death Stud, 9, 95-113.

Saavedra-Aguilar, J. C., & Gómez-Jeria, J. S. (1989). A neurobiological model for near-death experiences. J Near-Death Stud, 7, 205-222.

Sabom, M. B. (1982). Recollections of death. New York: Harper & Row.

Sartori, P. (2008). The near-death experiences of hospitalized intensive care patients: A five year clinical study. Lewiston, UK: Edward Mellen Press.

Schiller, F. C. S. (1894). Riddles of the sphinx: A study in the philosophy of evolution. London: Swan Sonnenschein.

Schwartz, J. M., Stapp, H. P., & Beauregard, M. (2005). Quantum physics in neuroscience and psychology. Phil Trans Roy Soc B, 360, 1309-1327.

Searle, J. R. (2000). Consciousness. Ann Rev Neurosci, 23, 557-578.

Shulman, R. G., Hyder, F., & Rothman, D. L. (2003). Cerebral metabolism and consciousness. Comptes Rendus Biologies, 326, 2532-273.

Sidgwick, E. M. (1885). Notes on the evidence, collected by the Society, for phantasms of the dead. Proc Soc Psychical Res, 3, 69-150.

Spitellie, P. H., Holmes, M. A., & Domino, K. B. (2002). Awareness under anesthesia. Anesthesiol Clin N Amer, 20, 555-570.

Stapp, H. P. (2007). Mindful universe: Quantum mechanics and the participating observer. Berlin: Springer-Verlag.

Stevenson, I., & Cook, E. W. (1995). Involuntary memories during severe physical illness or injury. J Nerv Ment Dis, 183, 452-458.

Tononi, G., & Laurys, S. (2009). The neurology of consciousness: An overview. In S. Laurys & G. Tononi (Eds.), The neurology of consciousness: Cognitive neuroscience and neuropathology (pp. 375-412). Amsterdam: Elsevier.

Turetskaia. B. E., & Romanenko, A. A. (1975). Agonal remission on the terminal stages of schizophrenia. Korsakov J Neuropathol Psychiat, 75, 559-562.

Van Lommel, P. (2004). About the continuity of our consciousness. Adv Exper Med Biol, 550, 115-132.

Van Lommel, P., van Wees, R., Meyers, V., & Elfferich, I. (2001). Near-death experience in survivors of cardiac arrest. Lancet, 358, 2039-2045.

Vriens, E. M., Bakker, P. F. A., DeVries, J. W., Wieneke, G. H., & van Huffelin, A. C. (1996). The impact of repeated short episodes of circulatory arrest on cerebral function. EEG Clin Neurophysiol, 98, 236-242.

Watson, J. B. (1914). Behavior. New York: Holt.

Whinnery, J. E. (1997). Psychophysiologic correlates of unconsciousness and near-death experiences. J Near-Death Stud, 15, 473-479.

White, N.S., & Alkire, M. T. (2003). Impaired thalamocortical connectivity in humans during general-anesthetic-induced unconsciousness. NeuroImage, 19, 402-411.

Woerlee, G. M. (2004). Cardiac arrest and near-death experiences. J Near-Death Stud, 22, 235-249.

14. Consciousness Of The Future: PreCognition, Premonition, Deja Vu

R. Gabriel Joseph

Cosmology.com

The Future Already Exists

In a quantum universe all of existence consists of a frenzy of subatomic activity which can be characterized as possessing pure potentiality and all of which are linked and entangled as a basic oneness which extends in all directions and encompasses all dimensions including time (Bohr, 1958, 1963; Dirac, 1966a,b; Planck 1931, 1932, Heisenberg 1955, 1958; von Neumann 1937, 1955). The act of observation be it visual, auditory, tactile, mechanical, digital, is entangled with the quantum continuum and creates a static impression of just a fragment of that quantum frenzy that is registered in the mind of the observer as length, width, height, first, second, and so on; like taking a single picture of something in continual motion, metamorphosis, and transformation. That is, the act of sensory registration, be it a function of a single cell, or the conscious mind of a woman or man, selects a fragment of the infinite quantum possibilities and experiences it as real, but only to that mind or that cell at the moment of registration (Heisenberg 1955, 1958).

"I regard consciousness as fundamental. I regard matter as derivative from consciousness" (Max Planck, 1931).

Time, the fragmentation of time into temporal sequential units and where "causes" precedede "effects," are also a "derivative of consciousness." If time is a feature of the quantum continuum, and if considered independent of "consciousness" then causes and effects may be one and the same, a unity and simultaneity; or causes may cause themselves, or effects may be responsible for the causes; and this is because the future is not separate from the present or the past, but all are one extending in multiple directions and dimensions until perceived by a conscious mind.

If time has a wave function not only would the future be linked to the past as a unity, but the conscious mind would be linked to the future and the past, thereby accounting for premonitions (vs anticipation) of what is going to take place; and this is because what will take place has already taken place. The future causes the premonition. And just as likely, the premonition may cause the future due to entanglement.

Then there are "effects" without any apparent "cause;" a possible

consequence of the future effecting the present (Aharonov et al. 1988; Bem 2011; Radin 2006' Cho 2011). However, typically, these "effects" are written off as "mistakes" or due to "coincidence." Nevertheless, in an entangled universe the wave function of time representing the future can be predicted to interact with the wave function of the present (and vice versa) thereby inducing a causality-violating reduction of the wave form as perceived by the conscious mind.

Entanglement occurs across space and time with the future entangling the present and the past (Megidish et al. 2013). For example, photons preserve their coherence for long time periods and can be entangled by projection measurements (Kwiat et al. 1995; Weinfurter 1994) and can remain maximally entangled although separated spatially and at remote distances from each other (Goebel et al 2008; Pan et al. 1998). Moreover, entanglement swapping protocols can entangle two remote photons even with a significant time-like separation and without any interaction between them (Ma et al., 2012; Megidish et al. 2013; Peres 2000). Entanglement has been demonstrated even following a delayed choice and even before there was a decision to make a choice. For example, when four photons were created and two were measured, the two became entangled. However, if a choice was then made to measure the remaining two photons, all four became entangled before it was decided to do a second measurement (Ma et al., 2012; Peres 2000). Entanglement can occur independent of and before the act of measurement. "The time at which quantum measurements are taken and their order, has no effect on the outcome of a quantum mechanical experiment" (Megidish et al. 2013) and effects can occur even before a decision is made to do additional measurements. The future, therefore, effects the present and the past.

Moreover, "two photons that exist at separate times can be entangled" (Megidish et al. 2013). As detailed by Megidish et al (2013): "In the scenario we present here, measuring the last photon affects the physical description of the first photon in the past, before it has even been measured. Thus, the "spooky action" is steering the system's past. Another point of view...is that the measurement of the first photon is immediately steering the future physical description of the last photon. In this case, the action is on the future of a part of the system that has not yet been created."

Hence, entanglement between photons has been demonstrated even before

the second photon even exists; “a manifestation of the non-locality of quantum mechanics not only in space, but also in time” (Megidish et al 2013). In other words, a photon may become entangled with another photon even before that photon is created, before it even exists in the present; and this is because the photon does exist in the future. Even after the first photon ceases to exist and before the second photon is created, both become entangled even though there is no overlap in time. Photons that do not exist can effect photons which do exist and photons which no longer exist and photons which will exist (Megidish et al. 2013); and presumably the same applies to all particles, atoms, molecules (Wiegner, et al 2011).

Therefore, as indicated by entanglement, the future may effect or take place before the past-present (Megidish et al 2013); and it is these same conditions which likely account for many of the experiences classified as deja vu, premonition, and precognition.

The laws of cause and effect are conscious constructs. Time is a phenomenon which is experienced by consciousness, which then fragments the experience of time into seconds, minutes, hours, days, weeks, the past, present, and future; when, in quantum theory, time just is. We are participant observers, and our conception of time like our conception of the universe is shaped by consciousness and the limitations of the mind and brain. We can not conceive of what we cannot conceive and tend to reject what does not abide by the “laws” erected by consciousness, and this includes the unity of time where causes may precedede effects and where the conscious mind may perceive the future before it becomes the present. That the future exists before it becomes the present, has been proved by entanglement and is a fundamental feature of space-time quantum continuum.

The Circle of Time

Time is linked to the Cosmos. There are a variety of conceptions as to the nature of the universe: curved, flat, finite, infinite, and so on. Einstein’s relativity predicts a curved universe, the curvature being due to gravity which in turn creates a lumpy universe with waves, valleys, vortexes, eddies, and innumerable geometric contortions all of which effect the trajectory of light and the fourth dimension known as space-time. And yet, because light, matter, and space-time may be torqued by gravity does that necessarily mean the cosmos in-itself is curved. Perhaps these curvatures only effect its

contents including the experience of time? In a curved universe anyone traveling in a "straight line" across the cosmos would eventually return to where they started. Einstein's field equations (Gödel 1949a,b) predict that time is a circle and that the future leads to the past.

It is generally assumed that the arrow of time flies from the present into the future. If time consists of just one dimension, then the observer can only go in one direction. And yet, there is nothing in the laws of physics indicating that a particular direction is preferred. Likewise, although light waves travel in a direction, the laws of electromagnetism do not make a distinction between the past and future (Pollack & Stump, 2001; Slater & Frank, 2011). Einstein (1955) argued that the distinctions between the past present and future are an illusion and that the past, present and future differ according to location, gravity, and speed of movement. Like a flowing river, the "present," "past" and "future" are relative to the location of observer along the banks of that river; whereas in fact, the river has no present, past, future, or upstream or downstream, it just flows as its own unity. If space-time is curved as predicted by Einstein (1961) and if time is a circle (Gödel 1949a, b), then the river of time is also a unity as predicted by quantum physics. However, in a curved universe, the future leads to the present and then the past (Gamow, 1946; Gödel 1949a, b).

The eternal now, experienced as the present, is like an event horizon with the future on one side and the past on the other. The future is always arriving whereas the past is always receding. Certainly it is possible that the arrow of time splits and bifurcates at the threshold of consciousness and flows toward the future and the past. However, quantum mechanics and relativity predict that the arrow of "now" is from the future to the present and then the past.

Even if time is in motion and limited to one direction, then the observer would not be moving forward in time, but future time would be flowing toward the observer and continue beyond the observer into the past. Consider the newly wed cowboy and his brushing bride sitting shyly on the edge of a carpet. What he intends to do to her is in the future. He lassos her and pulls her and the rug closer to him, and the rug curls up as he pulls. Although the rug stays the same length, the distance between the cowboy and his bride decreases. The future and the present come closer together. However, the future exists before it arrives. This is proved by relativity and length contraction for accelerated observers (Einstein et al. 1923).

When accelerating toward light speed, space-time contracts, and the distance between the present and the future will decrease; and this means, for the future to arrive more quickly, then it must already exist, albeit in a distant location in space-time, which is what Einstein (1955, 1961) implied when he insisted that the distinctions between past, present and future were illusions. And if the future, a future, or any number of futures already exists, then those futures may effect the present, just as the ripples from a rock thrown into a clear crystal pond can intersect distant shores.

The Future In One Location May Be The Past In Another Location

The star Sirius A is 8.6 light years from Earth. Light-images which left Sirius 1.6 light years ago, are from that star's past, but will not reach Earth for another 7 light years in Earth's future. Therefore, someone living on a planet orbiting Sirius would be able to predict events before they take place on Earth. If something which has already happened is not perceived until the future on Earth, then that future already exists even before it is experienced on Earth.

Conversely, light from our sun and accompanying reflective light-images of Earth from yesterday, are from this solar system's past, but will not reach Sirius for 8.6 light years, and are thus in the future relative to Sirius. The future and the past are relative and overlap and can travel in the same direction in time-space and can occupy the same forward or backward mobile locations in time-space simultaneously. However, again, what has just taken place on Earth, what has just happened, will not be experienced on a planet orbiting Sirius for another 8.6 light years.

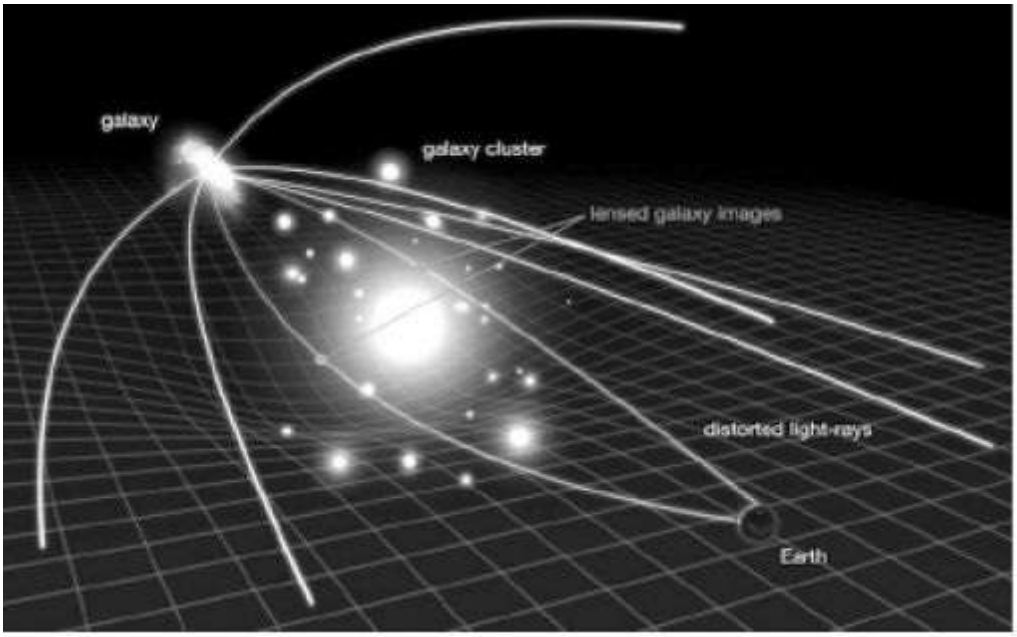
There is no universal now, no universal future, no universal past. There are innumerable stars, innumerable observers, and innumerable pasts, presents, and futures. Thus, multiple futures, which already exist, flow from multiple directions toward Earth and which will be experienced by innumerable observers. It is only the conscious mind of the observer which determines what takes place in the present; even if it has already happened in the future.

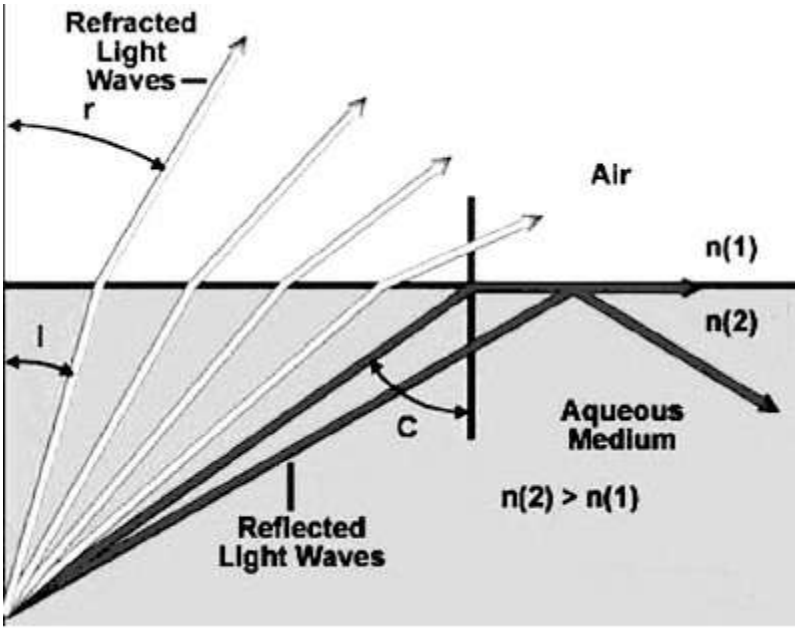
Predicting A Future Which Exists Before It Is Experienced

Relativity and quantum physics both predict the future exists before it is experienced. However, due to entanglement, and chaos, the future may continually change until the moment it is perceived.

According to Einstein's theories, as a space-time machine accelerates toward

light speed, the future arrives more quickly relative to those back on Earth. If the space-time machine were to slow, it would take longer to arrive at the future. Likewise, although light travels at light speed, the speed of light can be bent, curved, and slowed. For example, lights slow by 25% when passing through water and by 35% when passing through glass. Rays of light may also be bent and reflected in multiple directions, as illustrated by galactic lensing.




Refracted
Light
Waves —
r
Air
n(1)
n(2)
I
C
Aqueous
Medium
n(2) > n(1)
Reflected
Light Waves

Figures: Refraction and Gravitational Lensing: Light is curved, bent, split.

Time and light are not synonymous. However, since time appears to be linked to light speed, and as time is integral to space-time, then perhaps time, like light can also be bent, curved, split-apart, slowed as well as effect and be effected by all that it encounters, including, consciousness.

Since futures and pasts overlaps and as time-space is coextensive, then time, including local time relative to a single observer, is entangled. The past may effect the future, the future can effect the past, time effects consciousness and alterations in consciousness effect the passage of time.

As a "future" flows toward Earth it can also be effected by whatever it encounters on the way to the present, relative to an observer on Earth--exactly as befalls light. All futures are also entangled with space-time, the quantum continuum, and subject to the Uncertainty Principle. Therefore, future time may be continually altered until perhaps just moments before these futures are experienced by observers who are also entangled with what they experience.

Likewise, one may anticipate and predict the future, just like they may predict the weather. The ability to accurately anticipate and predict the future, like

predicting future weather, may increase the closer that future is to the present. Planning skills, goal formation, strategy, long term investments, concern for consequences, and even the most basic of calendars, all rest upon the ability to make predictions about the future.

The future is like the weather, with the ability to forecast the weather decreasing in accuracy as time and distance from the present increases. In other words, and because of entanglement and classic concepts governing "cause and effect", the future is not already determined but is in flux and subject to continual alteration. The act of observing and other forces related to cause and affect alter the quantum continuum and change the future as it approaches. The future may not become fixed until the moment it is perceived by an observer relative to that observer, at which point it is in the present. Hence, predictions about the future will seldom be completely accurate, and become less accurate regarding increasingly distant events in the future, but more accurate but not completely accurate regarding events in the immediate future; a consequence of entanglement and the Uncertainty Principle.

Since the past is also relative and can exist in the future for some observers and in the present for others, and as the past is entangled with the quantum continuum, then the past is also subject to change after it has been experienced and before it is experienced by another observer at a downstream location in space-time. Two historians writing about history interpret the past differently. A husband and wife discussing what happened at a party the night before, disagree. Eye-witness accounts differ among eye-witnesses. A peasant living in a small village in western China in 1963 may have never heard of the assassination of president John F. Kennedy. The past is relative. There is no universal "past."

Time is entangled and is affected by consciousness and relative to and effected by the act of observation and measurement--as predicted by quantum mechanics (Bohr, 1958, 1963; Dirac, 1966a,b; Planck 1931, 1932, Heisenberg 1927, 1958; Neumann 1937, 1955).

Causes and Effects Are Relative To Consciousness

If the future already exists, and if superluminal particles or information can arrive in the present from the future before they are perceived, this, coupled with entanglement (Plenio 2007; Juan et al. 2013; Francis 2012), may result

in causes becoming confused with effects, whereas it is the future which is causing and effecting the present (Bem 2011; Radin 2006).

In some respects, sometimes the association between and the classification of one event as a "cause" and the other an "effect" are little more than illusion, as demonstrated by quantum entanglement and "spooky action at a distance" (Francis 2012; Lee et al. 2011; Matson 2012; Olaf et al. 2003; Plenio 2007; Juan et al. 2013;). Just as, according to the quantum physics, the observing mind interacts with the quantum continuum and makes it possible to perceive shape and form, the conscious mind (and the dreaming mind) can also impose temporal order where this is none (Joseph 1982, 1986, 2010a).

For example, it has been well established that the neocortical mantle of the left hemisphere is dominant for the expressive, nominal, grammatical aspects of language, most aspects of mathematical reasoning, and is associated with processing and thinking in terms of temporal sequential order, and beginning and endings (Joseph 1982, 1984, 1986, 1992, 1996, 2011). As demonstrated by quantum mechanics and formalized by the Uncertainty Principle (Heisenberg 1925, 1927), consciousness affects reality at the moment an event or object is measured or registered in consciousness, and thus imposes shape, form, speed, momentum, location, and temporal order. However, what is known, is imprecise (Bohr, 1958, 1963; Dirac, 1966a,b; Planck 1931, 1932, Heisenberg 1955, 1958; Neumann 1937, 1955). To know something in its totality, would require a multi-dimensional all encompassing infinite "god's eye" view.

Moreover, as demonstrated by neuroscience, the mind is not a singularity, but a multiplicity with different aspects of consciousness and awareness directly associated with specific regions of the brain (Joseph, 1992, 1996, 2011). These different mental realms and brain areas can perceive time and the quantum continuum differently. Time may be perceived by one brain region as lacking temporal order but as a continuum or gestalt. The mind is a multiplicity, which can become a duality, and which is often experienced as a singularity referred to as consciousness.

Consciousness is entangled with the space-time continuum which includes the future. Conscious observers can also engage in "mental time travel" (Suddendorf & Corballis 2007). Upon anticipating or looking into the future the observing consciousness can then engage in behaviors that are shaped and directed by that future. What constitutes a cause and what constitutes an

effect, are relative and not uncommonly it is the anticipation of the future which causes the cause in the present.

A major corporation, A, which is a defendant in a Federal lawsuit with Plaintiff "B", promises the Judge "C", a large bribe at some future date if he rules against "B" and in favor of "A." After the the Judge rules against "B" he receives his bribe. Thus the "cause" of this judge's behavior, the "bribe", took place at a future date, such that the future affected the "present" (the issuing of false rulings). The future is the cause which effects the present. The cause, causes itself.

A man buys a beautiful woman flowers, candy, jewelry, and an expensive dinner at a five star restaurant. He doesn't lavish these gifts upon the lucky maiden because he loves her, but because he is hoping she will reciprocate, after the date, by giving him sex. The expectation of sex in the future, and thus an event in the future, is the cause of his behavior in the present. The future is the cause which effects and causes his behavior in the present.

Before he bought her these gifts the man may have fantasized about the date, how he would take her to his home, what he would say, what he would do, how she would respond. This could be described as "mental time travel; rehearsing and practicing for a future event before it occurs. As demonstrated by Bem (2011), future practice can effect performance in the present before the practice occurs.

Time is also relative. Hence, when the beautiful woman received these gifts she decided to reward him. Therefore, relative to and from the perspective of the lucky maiden, the effect (sex) is a direct consequence of the cause (his gifts). On the other hand, she also knew that she could cause him to give her gifts by giving him sex in the future. Future sex caused his behavior.

Consciousness is also part of the quantum continuum and so too is the future, present, and past. Thus, consciousness, like gravity and electromagnetic waves, is relative and can affect distant objects and events, including, perhaps, those in the future and the past (Planck 1931, 1932. Moreover, all have a wave function, and time and consciousness are entangled.

The past, present, future are entangled and occupy overlapping as well as distant locations flowing in a variety of directions and creating ripples in the river of time, just as rocks tossed at various distances into the smooth surface of a crystal lake creates ripples and waves which may intersect. It is well established that causes and effects can occur simultaneously and ever faster

than light speed (Lee et al. 2011; Matson 2012; Olaf et al. 2003). A future "cause" can "effect" the present even though separated by great distance in space-time as it is all part of the basic oneness of the quantum continuum which is also continuous with time.
However, since consciousness is also entangled, then consciousness may also perceive a future event before it occur; a phenomenon known as "precognition"

The Contraction and Acceleration of Time
If a Time Traveler was 1,900 miles (3,100 kilometers) above Earth and accelerating at 9.8 m/s^2 that is, generating a force of 9.8 N/kg, equal to the gravitational field strength of Earth at its surface, time-space would not contract and his clock would run at the same speed as those on Earth. Under these conditions, the Time Traveler would journey into the past or the future at the same time as those on Earth. This is because velocity, inertial mass and gravitational mass (g-load) would be the same for those on Earth and the Time Traveler
Upon accelerating toward light speed, the length of a space-time machine, unless capable of spin and rotation, will contract in the direction of motion and become increasing thin while maintaining height and width. Upon accelerating to 50% light speed, then 90% then 99.9999999% light speed, time-space would continue to contract, decreasing the distance between the present and the future, possibly with those areas of space-time closest to the nose of the time machine undergoing maximum contraction relative to more distant future locations.
Not all of space-time contracts. Space-time contraction is local and relative to the velocity of the Time Machine, such that the shrinkage of space-time is maximal at its nearest point to the Time Machine. If all inertial frames were equally contracted then clocks on Earth and clocks on the time machine would run at the same speed, and external observers would not see the time machine is shrinking where the Time Traveler would not see clocks running faster on Earth. if inertial frames are equal, time is symmetric.
Just as the exertion of pressure on a substance has its maximum impact beneath the point of contact, and just as the effects of gravity diminish over distance and increase near the center of gravity, time-space increasingly contracts as proximity to the time-machine increases as it moves through

space. Like gravity, the proportion of contraction decreases with increasing distance from the time machine, which means, the near future is proportionally closer than the far future.

For example, if a Time Traveler leaves on his journey in the year 2050 with a destination of 2250, and has a velocity of 99% light speed, space-time contraction would also be relative to the distance from the Time Machine, such that those years closest to 2050 (the location of the time machine in time-space) contract more than those years after 2051. In other words, if traveling at near light speed in the year 2050 the distance between the years 2050 and 2051 may contract by 10%, the distance between 2051 and 2052 by 9%, the distance between 2052 and 2053 by 8%, and so on. Upon reaching the year 2051, then the contraction between 2051 and 2052 might contract by 10% and between 2052 and 2053 by 9% and so on, such that amount of space-time contraction increases the closer it is to the Time Machine.

Not all space-time shrinks proportionately. The greatest shrinking would occur locally, within the immediate vicinity of the Time Machine such that the immediate future always arrives at the same time. By contrast, observers back on Earth and those at a great distance from the Time Traveler experience no shrinkage at all.

Into The Past: Invisibility

Relative to those on Earth, the Time Traveler arrives in the future in less time due to the contraction of space-time. Upon reaching light speed, and if traveling in a craft with rotation and spin, the Time Traveler may have become the size of a Planck length or smaller whereas surrounding space-time will have contracted to a singularity. Upon exceeding light speed, the contraction will implode, there is a time-space reversal, contraction continues in a negative direction, and he leaves the future for the past at superluminal speeds. However, he will likely consist of negative energy and negative mass and like all other superluminal objects, particles, or wave, he will be invisible since he is traveling faster than light.

There is a duality, and this is because the Time Traveler is moving faster than light and the reflected light images of the Time Machine will trail behind. Therefore, the Time Machine will have already arrived in the present from the future, and will be on its way to the past, when the light-image, following right behind, finally shows up in the present (relative to the observer). However, the time machine itself will be invisible since it is traveling faster

than the light which reflects its image.
Moreover, his reflected light-image, which follows far behind, will be misperceived as traveling not from the future into the past, but from the present into the future. Likewise, “causes” which occur in the future may be misperceived as occurring in the present.
For example, an observer watching a movie running in reverse of a distant rocket orbiting well above Earth may not realize it is playing in reverse. Unless they have expertise in rocketry they may not realize that the rocket is moving backwards in time (from the end of the film to the beginning) . Likewise, an observer on Earth moving forward in time, will see the Time Traveler who is heading into the past, as moving forward in time, but with the tail end of the Time Machine leading the way. However, what the Earth-bound observer sees in the present, has already happened in a future leading to her present and has already left the present for the past. What she experiences has already happened--just the moon you see is from 8 seconds ago.
Information, particles, objects, time machines moving backward in time will appear to be moving forward in time from the reference frame of an observer moving forward in time. The observer will see the reflected light image of the Time Machine as moving parallel forward in time with the observer. As to the actual Time Machine, since it is traveling faster than light, the observer may only perceive a blank spot in the sky and just behind it a reflected light-image which follows. Nevertheless, in either scenario, the Time Traveler will have already journeyed from the future to the present and into the past in advance of the light-image of the Time Machine which comes after.
Likewise, superluminal information from the future can arrive in the present and continue into the past, whereas Earth-bound observers will only detect and perceive the later arriving details which trail behind and arrive moments later at the speed of light. And, this information may not be perceived as from the future, but as coexisting in the present and leading back to the future. And this is because for every moment that leads to the future, the image or the information from the future will be there as it travels form the future to the past. For example, a Time Machine that leaves in the year 2150 for the year 2120, will be visible to observers in the year 2121, 2122, 2123, up to 2150 as it travels into the past. However, what they see is the light-image trailing right behind at the speed of light.

Information from the future may arrive without being perceived (Bem 2011; Radin 2006), and then it may be perceived (as conveyed by light), and then it may be misperceived as taking place in the present and continuing to take place as time marches on into the future.

Since consciousness is entangled with the quantum continuum, then not only may the mind perceive events before they take place, but they may perceive information traveling from the future to the past at superluminal speeds, and then continue to perceive it as time marches on into the future thereby providing the foundation for precognition and phenomenon such as deja vu.

Moreover, because information may appear in the present at superluminal speeds (Lee et al. 2011; Matson 2012; Olaf et al. 2003), followed by that same information as transmitted at the speed of light, this would explain why phenomenon such as deja vu and precognition are generally limited to what is about to happen, rather than what may take place next week or next year.

Deja Vu

Upon accelerating toward light speed a Time Travel is propelled into the future, but at beyond light speeds he is propelled into the past. A time machine with a velocity beyond light speed will travel faster than the reflected light images of that time machine which lag behind at light speed. The Time Machine will appear in the present only to be followed moments later by those beams of light transporting those images of the Time Machine. Superluminal information from the future can arrive in the present and continue into the past, whereas Earth-bound observers will only perceive the later arriving details which follow behind at the speed of light.

Entanglement commonly occurs at superluminal speeds (Francis 2012; Juan et al. 2013; Plenio 2007; Lee et al. 2011; Matson 2012; Olaf et al. 2003). However, if an entangled consciousness is effected by the passage of that superluminal information this can give rise to retro-cognition (Bem 2011; Radin 2006); knowing something has happened or will happen before it happens.

As illustrated by light-images from distant stars which are from the past but which will arrive on Earth in the future, various “futures” exist prior to being experienced by various observers. If time has a wave function and is entangled with space-time and the quantum continuum, and as the brain and consciousness are part of that continuum (Heisenberg 1958; Planck 1931,

1932), then under certain circumstances a future may effect consciousness prior to being experienced by consciousness. Since entanglement takes place faster than light speed, the leading edge of a future experience may be registered in various conscious minds at superluminal speeds before the future actually arrives at light speed. The experience of this "time echo" is not uncommon, and has been referred to as deja vu, pre-cognition, and premonitions.

Deja vu is the conscious experience of having experienced some events just moments before the events take place. For example, a man opens the front door, step outsides, drops his keys and then a dog barks and the phone rings, and then he again experiences himself opening the door dropping his keys and then hearing a dog bark and then the ringing of his phone; like a time echo. He thus has the experience that all this has happened before or that he has done this before it happens. He may even say: "I've done this before" and then a few nanoseconds later he experiences himself saying "I've done this before."

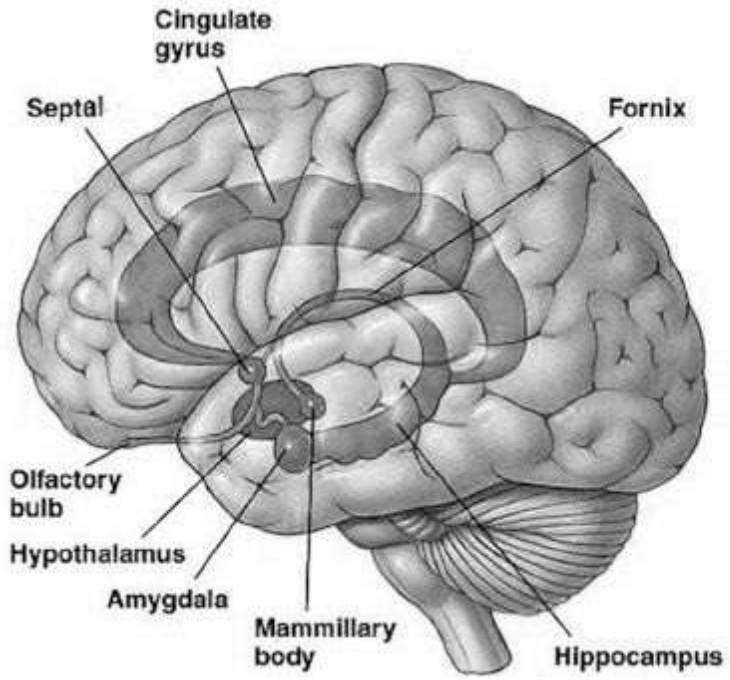
Deja vu has been attributed to a delay in the transfer of sensory experiences from one region of the brain to another which receives that information twice, or the transmission of the same experience to the same area of the brain by two different brain areas such that the information is received twice following a brief delay (Joseph 1996). Hence, someone may experience deja vu because two or more areas of the brain are receiving or processing the same message with a slight delay between them. For example, the right and left halves of the brain are interconnected by a massive rope of nerve fibers called the corpus callosum. Each half of the brain is capable of conscious experience (Joseph 1988a,b; 2010a). Usually information is shared between the cerebral hemispheres. However, if there is a delay in transferring these signals, then one or both halves of the brain may sense it has had this experience just moments before thereby giving a sense of familiarity (Joseph 1996).

Brain areas communicate via neurons, and neurons communicate with each other by sending signals over axons which are transmitted to and received by dendrites (at the synaptic junction) belonging to other neurons which in turn may transmit message via their axons at synaptic junctions to the dendrites of other neurons. Impulses between neurons travel at various speeds, ranging from 10 to 50 m / s (Joseph 1996) whereas the speed of light is 300,000 km/sec.

The experience of deja vu has been reported under conditions of altered and heightened brain activity (Bancaud et al., 1994; Gloor 1990; Joseph 1996). Moreover, deja vu has been reported in cases involving the ingestion of anti-viral flu vaccines, such as amantadine and phenylpropanolamine (Taiminen & Jääskeläinen 2001) which increases brain activity by acting on dopamine receptors and increasing dopamine activity.

Heightened brain activity can be likened to an accelerated state of consciousness. Accelerated states are also associated with the contraction of space-time such that future arrives more quickly.

Deja vu, is also associated with heightened and accelerated activity in the inferior temporal lobe which houses the limbic striatum and amygdala, the later of which receives multi-modal sensory information and which normally filters out most of these sensations so the brain is not overwhelmed (Joseph 1996, 2011). Deja vu has been reported by patients when these areas of the brain have been activated due to direct electrode stimulation (Halgren 1990; Gloor 1990), drug ingestion (Taiminen & Jääskeläinen 2001) or seizure activity (Joseph 1996).



Therefore, when brain activity increases and neurons fire more rapidly and process more information, one of the consequences is Deja vu. In other words, just as a Time Traveler will come closer to the future as he accelerates toward light speed, when brain activity accelerates the future may also come closer such that the leading edge of a future event is experienced by this accelerated state of consciousness just before the event happens in the present.

Precognition: Experimental Proof

Precognition is a form of conscious cognitive awareness which involves the acquisition of future knowledge just prior to its occurrence. Premonitions are a form of presentiment or an emotional feeling that something may happen in the near future, but without conscious knowledge of exactly what it is that is going to happen. Both can be considered forms of quantum entanglement (Radin 2006; Bem, 2011) where some near future event exerts and makes an impression on consciousness before the event occurs even when there is absolutely no way the future event could be inferred as about to happen.

Various surveys have indicated that over 50% of adults have experienced premonitions or phenomenon which could be classified as precognition (Kennedy et al., 1994; Radin 2006). Moreover, numerous rigorous, scientifically controlled experiments and meta-analyses of these experiments have demonstrated statistically significant evidence for precognition and premonitions (Honorton & Ferrari 1989; Radin 2006). For example Honorton and Ferrari (1989) performed a meta-analysis of 309 forced-choice precognition experiments involving over 50,000 subjects, and which had been published in scientific journals between 1936 and 1997. They found a consistent, statistically significant hit rate, meaning that the results could not be due to chance.

As with deja vu, increased brain activity or arousal contributes to precognitive activity (Bem, 2011; Radin 1997, 2006; Spottiswoode & May, 2003). Presentiment effect has also been directly related to increased brain activity as demonstrated in fMRI experiments (Bierman & Scholte, 2002) and with other physiological indices of participants' emotional arousal in which

case they become aroused before they see the stimulus (Radin 1997). For example, when participants viewed a series emotionally neutral or emotionally arousing pictures on a computer screen, strong emotional arousal occurred a few seconds before the picture appeared, even before the computer had selected which emotional picture was to be displayed (Radin 1997, 2006).

In 2011, a well respected scientist, Daryl Bem published extensive statistically significant evidence for the effects of future events on cognition and emotion, demonstrating that the effect is in the present whereas the cause can still be in the future. For example, Bem had subjects perform a memory test which required that each subject look at a long list of words and to remember as many as possible. After completing the memory test he had the subjects type various words from that list which were randomly selected. Subjects showed statistically superior memory for the words which they were later asked to type. That is, the practice effect was retrocausal. The practice which was to take place in the future (the typing of words they had already seen) improved their memory of those words before they typed them. Thus, rehearsing a set of words makes them easier to recall even when the rehearsal occurs in the future and after subjects recall the words.

In another set of experiments Bem (2011), allowed a computer to control the entire procedure which involved showing each subject "explicit erotic images." The instructions were as follows: "on each trial of the experiment, pictures of two curtains will appear on the screen side by side. One of them has a picture behind it; the other has a blank wall behind it. Your task is to click on the curtain that you feel has the picture behind it." Statistical analysis of the results demonstrated that based on "feelings" subjects picked the location of the pornographic image at well above chance (even though they couldn't see it), whereas the location of the non-erotic neutral pictures were chosen at the rate of chance, i.e. 49.8% of the time.

Bem (2011) performed nine rigorously controlled experiments involving over 1000 subjects involving erotic stimuli, the avoidance of negative stimuli, and retroactive priming effects on memory and recall. Eight of the nine experiments yielded statistically significant results, and thus evidence for precognition and premonition.

Criticism of Precognition Experimental Results: The Baseball Analogy

A common criticism regarding the validity of research on premonitions and precognition is: if it exists, why doesn't it happen all the time? Why doesn't everyone have these experiences?

Consider major league baseball. In 2013, Miguel Cabrera had a batting average of .348 which was the best of all major league players. Although he is the best hitter in major league baseball, he hit the ball less than 50% of the time when he was at bat, and was able to get a "base hit" less than 35% of the time. Out of 750 major league players, 726 of them got a base hit less than 30% of the time in 2013 during regular season play (http://espn.go.com/mlb/stats/batting). Given that these players had up to 5 opportunities to hit the ball each time at bat, and 3 opportunities to swing, it can be said that professional baseball players actually hit the ball less than 30% of the time. Bem (2011), Raden (1996, 2006) Bonorton and Ferrari (1989) and others have shown a precognition hit rate above 50%. But unlike major league baseball players, those displaying precognition get their hits before they see what is being thrown at them.

Precognition should be treated like all other measures of ability. We should not be surprised that there is variation (Carpenter 2004, 2005; Schmeidler, 1988). Indeed, the same complaints can be made about memory and past events: If it really happened, why does everyone remember it differently. Why do some people have a great memory and others are more forgetful? Why do different eye-witnesses remember the same event differently?

Even highly arousing and emotionally significant "flashbulb memories" are subject to considerable forgetting. For example, Neisser and Harsch (1992) had subjects fill out a questionnaire regarding where they were and how they heard about the Challenger space craft explosion soon after this national tragedy occurred in 1986. When these subjects were questioned again 32-34 months later, 75% could not recall filling out the questionnaire. Many of the subjects in fact had forgotten considerable detail regarding the Challenger explosion and where they were when the heard about it. According to Neisser and Harsch (1992), "As far as we can tell, the original memories are just gone."

Memory is poor. Batting averages are dismal. Should it be any surprise that premonitions and the experience of precognition is also variable?

The Quantum Physics of Premonition and Retrocausation

The phenomenon of premonition must be considered from the perspective of quantum physics not Newtonian physics or Einstein's theories of relativity. As summarized by John Stewart Bell in his 19964 ground breaking paper ("On the Einstein Podolsky Rosen paradox") "any physical theory that incorporates local realism, favoured by Einstein cannot reproduce all the predictions of quantum mechanical theory."

In 2006, the American Association for the Advancement of Science organized an interdisciplinary conference of research scientists and physicists to discuss evidence for retrocausation as related to quantum physics, the conclusions of which were published in 2006: "it seems untenable to assert that time-reverse causation (retrocausation) cannot occur, even though it temporarily runs counter to the macro-scopic arrow of time" (Sheehan, 2006, p vii).

As demonstrated by quantum physics and entanglement, the future may effect and even direct the past or the present. Consider again entanglement between photons. In delayed choice experiments, entanglement was demonstrated among photons even before there was a decision to make a choice regarding these photons, that is, before it was decided to do a measurement (Ma et al., 2012; Peres 2000). Entanglement has also been demonstrated among photons which do not yet exist, where the choice has not even been made to create or measure future photons. Nevertheless, decisions which will be made in the future effect the measurement of photons in the present (Megidish et al 2013). The same principles can be applied to precognition. Information in the future, information which does not yet exist in the present, can effect and is entangled with the consciousness which will directly perceive that information once it arrives in the present.

The future, past, present, and consciousness are entangled within the quantum continuum. The future exists before it arrives and some people consciously perceive a future before it becomes the present; phenomenon which can be classified as evidence of entanglement and which are variably experienced as deja vu, premonitions, and precognition.

The future, past, present, and consciousness are entangled within the quantum continuum. The future exists before it arrives and some people consciously perceive a future before it becomes the present; phenomenon which can be classified as evidence of entanglement and which are variably experienced as deja vu, premonition, and precognition.

REFERENCES

Al-Khalili (2011). Black Holes, Wormholes and Time Machines, Taylor & Francis.

Almheiri, A. et al. (2013). Black Holes: Complementarity or Firewalls? J. High Energy Phys. 2, 062

Bethe, H. A., et al., (2003) Formation and Evolution of Black Holes in the Galaxy, World Scientific Publishing.

Bilaniuk, O.-M. P.; Sudarshan, E. C. G. (1969). "Particles beyond the Light Barrier". Physics Today 22 (5): 43–51.

Bo, L., Wen-Biao, L. (2010). Negative Temperature of Inner Horizon and Planck Absolute Entropy of a Kerr Newman Black Hole. Commun. Theor. Phys. 53, 83–86.

Bohr, N., (1913). "On the Constitution of Atoms and Molecules, Part I". Philosophical Magazine 26: 1–24.

Bohr, N., (1913). "On the Constitution of Atoms and Molecules, Part I". Philosophical Magazine 26: 1–24.

Bohr, N. (1934/1987), Atomic Theory and the Description of Nature, reprinted as The Philosophical Writings of Niels Bohr, Vol. I, Woodbridge: Ox Bow Press.

Bruno, N. R., (2001). Deformed boost transformations that saturate at the Planck scale. Physics Letters B, 522, 133-138.

Blandford, R.D. (1999). "Origin and evolution of massive black holes in galactic nuclei". Galaxy Dynamics, proceedings of a conference held at Rutgers University, 8–12 Aug 1998,ASP Conference Series vol. 182.

Carroll, S (2004). Spacetime and Geometry. Addison Wesley.

Casimir, H. B. G. (1948). "On the attraction between two perfectly conducting plates". Proc. Kon. Nederland. Akad. Wetensch. B51: 793.

Chodos, A. (1985). "The Neutrino as a Tachyon". Physics Letters B 150: 431.

Einstein, A. (1915a). Fundamental Ideas of the General Theory of Relativity and the Application of this Theory in Astronomy, Preussische Akademie der Wissenschaften, Sitzungsberichte, 1915 (part 1), 315.

Einstein, A. (1915b). On the General Theory of Relativity, Preussische Akademie der Wissenschaften, Sitzungsberichte, 1915 (part 2), 778–786.

Einstein A. (1939) A. Einstein, Ann. Math. 40, 922.

Einstein, A. (1961), Relativity: The Special and the General Theory, New York: Three Rivers Press.

Einstein, A. and Rosen, N. (1935). “The Particle Problem in the General Theory of Relativity”. Physical Review 48: 73.

Einstein, A., Lorentz, H.A., Minkowski, H., and Weyl, H. (1923). Arnold Sommerfeld. ed. The Principle of Relativity. Dover Publications: Mineola, NY. pp. 38–49.

Einstein A, Podolsky B, Rosen N (1935). “Can Quantum-Mechanical Description of Physical Reality Be Considered Complete?”. Phys. Rev. 47 (10): 777–780.

Eisberg, R., and Resnick. R. (1985). Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles. Wily,

Everett, A., & Roman, T. (2012). TIme Travel and Warp Drives, University Chicago Press.

Feinberg, G. (1967). “Possibility of Faster-Than-Light Particles”. Physical Review 159 (5): 1089–1105.

Fuller, Robert W. and Wheeler, John A. (1962). “Causality and Multiply-Connected Space-Time”. Physical Review 128: 919.

Garay, L. J. (1995). Quantum gravity and minimum length Int.J.Mod.Phys. A10 (1995) 145-166

Ghez, A. M.; Salim, S.; Hornstein, S. D.; Tanner, A.; Lu, J. R.; Morris, M.; Becklin, E. E.; Duchene, G. (2005). “Stellar Orbits around the Galactic Center Black Hole”. The Astrophysical Journal 620: 744.

Geiss, B., et al., (2010) The Effect of Stellar Collisions and Tidal Disruptions on Post-Main-Sequence Stars in the Galactic Nucleus. American Astronomical Society, AAS Meeting #215, #413.15; Bulletin of the American Astronomical Society, Vol. 41, p.252.

Giddings, S. (1995). The Black Hole Information Paradox,” Proc. PASCOS symposium/Johns Hopkins Workshop, Baltimore, MD, 22-25 March, 1995, arXiv:hep-th/9508151v1.

Hawking, S. W., (1988) Wormholes in spacetime. Phys. Rev. D 37, 904–910.

Hawking, S., (1990). A Brief History of Time: From the Big Bang to Black Holes. Bantam.

Hawking, S. (2005). “Information loss in black holes”. Physical Review D

72: 084013.

Hawking, S. W. (2014). Information Preservation and Weather Forecasting for Black Holes.

Heisenberg, W. (1927), "Über den anschaulichen Inhalt der quantentheoretischen Kinematik und Mechanik", Zeitschrift für Physik 43 (3–4): 172–198.

Heisenberg. W. (1930), Physikalische Prinzipien der Quantentheorie (Leipzig: Hirzel). English translation The Physical Principles of Quantum Theory, University of Chicago Press.

Heisenberg, W. (1955). The Development of the Interpretation of the Quantum Theory, in W. Pauli (ed), Niels Bohr and the Development of Physics, 35, London: Pergamon pp. 12-29.

Heisenberg, W. (1958), Physics and Philosophy: The Revolution in Modern Science, London: Goerge Allen & Unwin.

Jaffe, R. (2005). "Casimir effect and the quantum vacuum". Physical Review D 72 (2): 021301.

Joseph, R (2010a) The Infinite Cosmos vs the Myth of the Big Bang: Red Shifts, Black Holes, and the Accelerating Universe. Journal of Cosmology, 6, 1548-1615.

Joseph, R. (2010b). The Infinite Universe: Black Holes, Dark Matter, Gravity, Acceleration, Life. Journal of Cosmology, 6, 854-874.

Joseph, R. (2014a) Paradoxes of Time Travel: The Uncertainty Principle, Wave Function, Probability, Entanglement, and Multiple Worlds, Cosmology, 18, 282-302.

Joseph, R. (2014a) The Time Machine of Consciousness, Cosmology, 18, In press.

Kerr, R P. (1963). "Gravitational Field of a Spinning Mass as an Example of Algebraically Special Metrics". Physical Review Letters 11 (5): 237–238.

Lambrecht, A. (2002) The Casimir effect: a force from nothing, Physics World, September 2002

Lorentz, H. A. (1892), "The Relative Motion of the Earth and the Aether", Zittingsverlag Akad. V. Wet. 1: 74–79

McClintock, J. E. (2004). Black hole. World Book Online Reference Center. World Book, Inc.

Melia, F. (2003). The Edge of Infinity. Supermassive Black Holes in the Universe. Cambridge U Press. ISBN 978-0-521-81405-8.

Melia, F. (2007). The Galactic Supermassive Black Hole. Princeton University Press. pp. 255–256.

Merloni, A., and Heinz, S., (2008) A synthesis model for AGN evolution: supermassive black holes growth and feedback modes Monthly Notices of the Royal Astronomical Society, 388, 1011 1030.

Minchin, R. et al. (2005). “A Dark Hydrogen Cloud in the Virgo Cluster”. The Astrophysical Journal 622: L21–L24.

Morris, M. S. and Thorne, K. S. (1988). “Wormholes in spacetime and their use for interstellar travel: A tool for teaching general relativity”. American Journal of Physics 56 (5): 395–412.

O’Neill, B. (2014) The Geometry of Kerr Black Holes, Dover

Penrose, R. (1969) Rivista del Nuovo Cimento.

Preskill, J. (1994). Black holes and information: A crisis in quantum physics”, Caltech Theory Seminar, 21 October. arXiv:hep-th/9209058v1.

Pollack, G. L., & Stump, D. R. (2001), Electromagnetism, Addison-Wesley.

Rindler, W. (2001). Relativity: Special, General and Cosmological. Oxford: Oxford University Press.

Rodriguez, A. W.; Capasso, F.; Johnson, Steven G. (2011). “The Casimir effect in microstructured geometries”. Nature Photonics 5 (4): 211–221.

Ruffini, R., and Wheeler, J. A. (1971). Introducing the black hole. Physics Today: 30–41.

Russell, D. M., and Fender, R. P. (2010). Powerful jets from accreting black holes: Evidence from the Optical and the infrared. In Black Holes and Galaxy Formation. Nova Science Publishers. Inc.

15. The Sixth Dimension: Dream Time, Precognition, Many Worlds
R. Joseph, Ph.D.

It is through dreams that we may be transported to worlds that defy the laws of physics and which obeys their own laws of time, space, motion and conscious reality, where the future is juxtaposed with the past and where time runs backwards and forwards (Campbell, 1988; Freud, 1900; Jung, 1945, 1964). Throughout history it has been believed that dreams open doors to alternate realities, to the future, to the past, and the hereafter, where the spiritual world sits at the boundaries of the physical; hence the tendency to bury the dead in a sleeping position even 100,000 years ago (Joseph 2011a,b). Although but a dream, the dream was experienced during dream consciousness much as the waking world is experienced by waking consciousness. The dream was real. Thus, throughout history dreams have been taken seriously especially when they gave glimpses of the future.

Dream are often of events from the previous day and may concern the future. It is through dreams that the dreamer may gain insight into problems which have plagued him or which he anticipates encountering in the near future. Just as one can think about the future or the past and make certain deductions and predictions, a dream may include of anticipations regarding the future, and in this respect, the dream could be considered an imaginal means of preparation for various possible realities. As such, dream-time and dream-consciousness could be considered manifestations of the "Many Worlds" theory of quantum physics.

Not uncommonly the dream will include so many branching and overlapping multiple realities that it makes no sense at all, except to those skilled in the art of interpreting dream symbolism (Freud 1900; Jung 1945, 1964). Indeed, it is due to the non-temporal, often gestalt nature of dreams which require that they be consciously scrutinized from multiple angles in order to discern their meaning, for the last may be first and what is missing may be just as significant as what is there.

Dream-consciousness and dream-time are also associated with accelerated levels of brain activity (Joseph 2000, 2011a). Relativity predicts that observers with an accelerated frame of reference experience time-dilation and a shrinking of time-space such that the future and the present come closer

together relative to those with a different frame of reference (Einstein et al. 1923, Einstein 1961). Thus, during dream-time, the dreamer may see or experience the future before that future is experienced by the conscious mind.

Many Worlds of Quantum Dream-Time

There are at least three dimensions of time: space-time which obeys the laws of relativity; conscious-time which obeys the laws of quantum physics; and dream-time which defies the laws of Newtonian physics but which could be viewed as a manifestation of the "Many Worlds" interpretation of quantum mechanics. Whereas conscious-time occupies the 5th dimension, dream-time is the 6th dimension of the quantum continuum and the space-time manifold embraced by relativity.

Although dream-time encompasses dream-consciousness, dream-time and conscious-time are distinct. Consciousness and dreaming are not synonymous. Dreams may be observed by consciousness and as such, dreaming and consciousness are entangled as dream-consciousness. However, consciousness is generally little more than a passive witness during dreaming, an audience before the stage upon which the dreams are displayed in all their mystery and majestic glory. It is rare for consciousness to become conscious that "it" is observing a dream, and when such rarities occur the dreamer may awaken or briefly take an active role in what has been described as "lucid dreaming" (LaBerge, 1990).

Unlike conscious-time and the conscious mind, the dream-kaleidescape of dream-time and dream-consciousness could best be described as manifestation of the "Many worlds" interpretation of quantum physics where all worlds are possible and past and future and time and space are juxtaposed and intermingled; time can run backward and forward simultaneously and at varying speed, and multiple realities come and go no matter now improbable. Dream-time represents accelerated states of brain activity and is entangled with the "many worlds" and the space-time quantum continuum of future and past, and as such, while dreaming, the dreamer may obtain a glimpse of the future before it arrives.

Abraham Lincoln Dreams Of His Death

In April of 1965, less than two weeks before he was gunned down by an assassin's bullet, President Abraham Lincoln dreamed of his own

assassination (Lamon 1911). Lincoln told this dream to his wife and to several friends including Ward Hill Lamon who was Lincoln's personal friend, body guard and former law partner. According to Lincoln:

"About ten days ago, I retired very late. I had been up waiting for important dispatches from the front. I could not have been long in bed when I fell into a slumber, for I was weary. I soon began to dream. There seemed to be a death-like stillness about me. Then I heard subdued sobs, as if a number of people were weeping. I thought I left my bed and wandered downstairs. There the silence was broken by the same pitiful sobbing, but the mourners were invisible. I went from room to room; no living person was in sight, but the same mournful sounds of distress met me as I passed along. I saw light in all the rooms; every object was familiar to me; but where were all the people who were grieving as if their hearts would break? I was puzzled and alarmed. What could be the meaning of all this? Determined to find the cause of a state of things so mysterious and so shocking, I kept on until I arrived at the East Room, which I entered. There I met with a sickening surprise. Before me was a catafalque, on which rested a corpse wrapped in funeral vestments. Around it were stationed soldiers who were acting as guards; and there was a throng of people, gazing mournfully upon the corpse, whose face was covered, others weeping pitifully. 'Who is dead in the White House?' I demanded of one of the soldiers, 'The President,' was his answer; 'he was killed by an assassin.' Then came a loud burst of grief from the crowd, which woke me from my dream. I slept no more that night; and although it was only a dream, I have been strangely annoyed by it ever since."

The 6 Dimensional Time-Space Manifold

Euclidean geometry dictates that the universe has three dimensions of space and one of time which is independent of motion, with time progressing at a fixed rate in all reference frames. Time is treated as universal and constant, being independent of the state of motion of an observer.

In Euclidean space, the separation between two points is measured by the distance between them. The distance is purely spatial, and is always positive. A minus sign is associated with the dimension of time. If two events have a greater separation in time than in space, this results in a negative and they have a time-like separation. If the quantity is positive, the two events have a space-like separation which is greater than their separation in time. If the

result is 0, then the two events have a light-like separation and are connected only by a beam of light.

For example, if a football player throws a pass and it is caught by a retriever 50 feet distant after an elapse of 5 seconds (5000000000 nanoseconds), then the separation in space is 50 and the separation in time is 5. By calculating the square of the separation in space minus the square of the separation in time, it can then be determined if the separation of the two events are space-like or time-like:

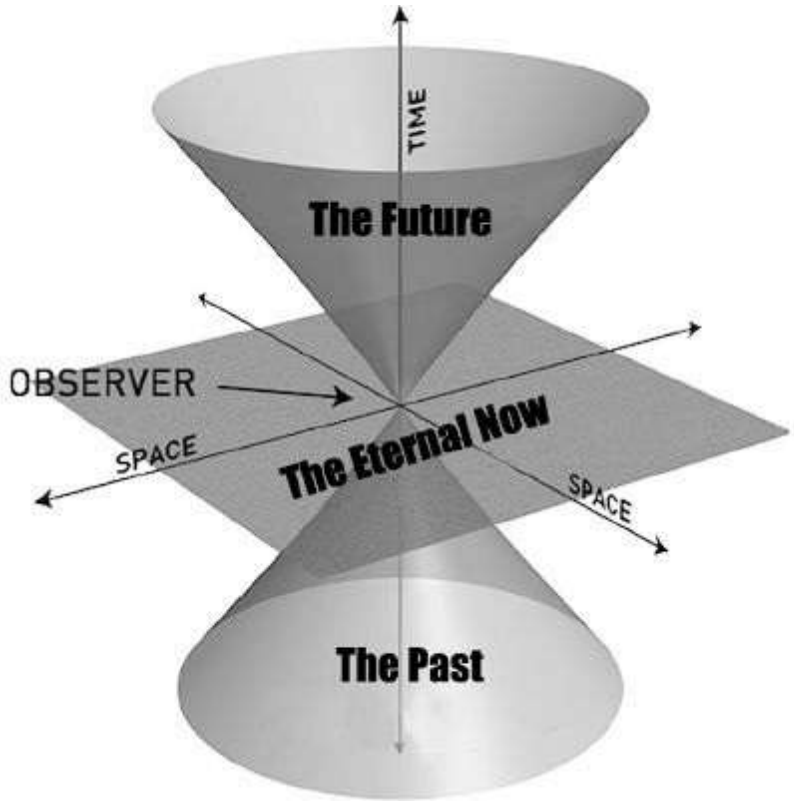
50^2 (feet) 5000000000^2(nanoseconds) = 2,500 500000000000 = -499999998500

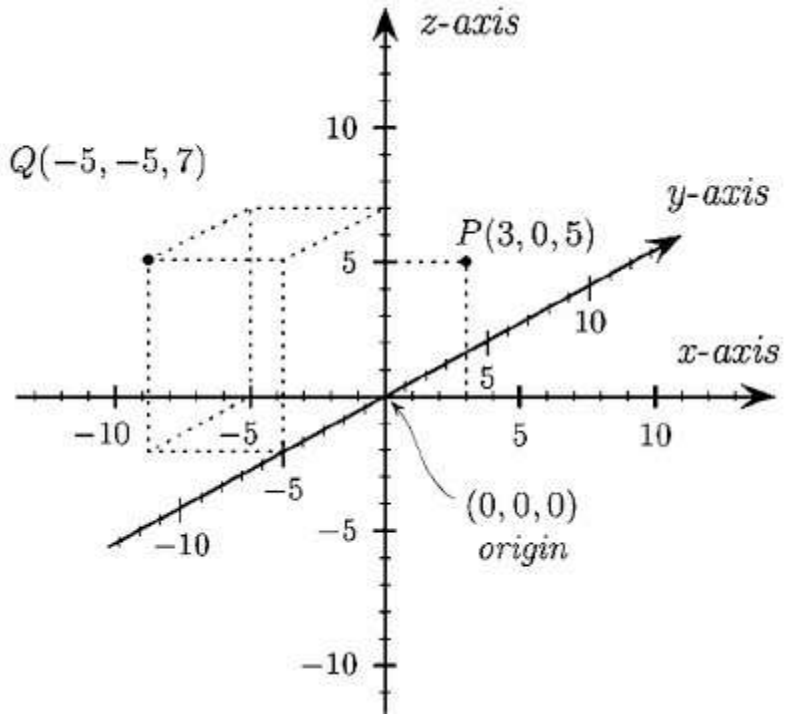
In this instance, since the results are a negative, the two events have a greater separation in time than in space.

The star Proxima Centauri is 4.2 light years from Earth. If the time traveler was required to visit that star 10 years from today, then they would be separated by 4.2 light years in space and 10 years in time. Thus it would be 4.2^2(space) 10^2 (time) = 17.64 100 = -82.38 meaning that the two events are separated in time and have a -82.38 time-like separation from now. However, if the time traveler had to arrive on Proxima Centauri in 3 years, then it would have a space-like separation and it would be impossible for him to get there is 3 years since there is not enough time; unless he were to exceed the speed of light or travel via dream-time.

In relativity, space and time are combined as a single continuum within a fourth dimension: space-time (Einstein 1961). In space-time, the separation between two events is measured by the invariant interval between the two events, which takes into account not only the spatial separation between the events, but also their temporal separation. For two events separated by a time-like interval, enough time passes between them that there could be a cause–effect relationship between the two events.

In space-time, a coordinate grid that spans the 3+1 dimensions locates events (rather than just points in space) whereas the other 3 dimensions (considered separately) locate a point and location in a certain defined "space." The spatial location of an event is designated by three coordinates, X, Y, Z, whereas a fourth coordinate is based on time; all of which constitute "frames of reference." Together the 3+1 dimensions locates events and when and where they took place. Therefore, in relativistic contexts time remains entangled with the other three dimensions of space (length, width, height).


TIME
The Future
OBSERVER
SPACE
The Eternal Now
SPACE
The Past



As theorized by Einstein (1961), and unlike the Copenhagen model of quantum physics (Bohr 1949; Heisenberg 1927, 1958), space-time is relative to but independent of any observer. Consciousness is relative but irrelevant having no effect on the passage of time. In relativity, each event which occurs at certain moments of time in a given region of space are relative to those observers in different regions of space, such that each observer chooses a convenient metrical coordinate system in which these events are specified by four real numbers. All four dimensions are measured in terms of units of distance, e.g. in two spatial dimensions x and y and a time dimension orthogonal to x and y.

However, in further contrast to the Euclidian perspective, in an Einsteinian

universe the observed rate at which time passes for an object depends on accelerated frames of reference and the strength of gravitational fields; all of which can slow or accelerate the passage of time, depending on the object's velocity relative to the observer (Einstein 1961). Specifically, time slows at higher speeds in one reference frame relative to another reference frame. The duration of time can therefore vary according to reference frames.

In relativity consciousness is merely relative. In quantum physics, consciousness is a separate reference frame which can collapse the wave function and register entangled interactions within the environment. Consciousness by the act of observation or measurement takes a static or series of pictures-in-time which then becomes discontinuous from the quantum continuum (Heisenberg 1958; Planck 1931; von Neumann 2001). These entanglements (Francis 2012; Juan et al. 2013; Plenio 2007), or blemishes in the quantum continuum, may be observed as shape, form, cause, effect, past, present, future, the passage of time, and thus reality; the result of a decoupling of quanta from the quantum (coherent) continuum which leaks out and then couples together in a knot of activity which is observed as a wave form collapse.

As based on the Copenhagen theory of quantum mechanics (Bohr, 1958, 1963; Heisenberg 1955, 1958), time and reality are a manifestation of wave functions and alterations in patterns of activity within the quantum continuum which are perceived by consciousness as discontinuous. Wave form collapse is always a matter of probability, and is non-local, indeterministic and a consequence of conscious observation, measurement, and entanglement. Consciousness, therefore, is entangled with the quantum continuum, and alterations in consciousness can alter the continuum and the space-time manifold. Just as a Time Traveler can accelerate or slow down, contracting or dilating time and time-space, consciousness can accelerate or slow down, and time will slow down or speed up accordingly. Conscious-time represents a second dimension of time, whereas dream-time represents a third dimension of time.

During dream-time the brain is in a "paradoxical" state of accelerated activity, known as paradoxical sleep, as demonstrated by rapid eye movement (REM) and electrophysiological activity (Frank, 2012, Pagel, 2014, Stickgod & Walker, 2010). As predicted by Einstein's (1961) relativity, under accelerated states time contracts and the future arrives more quickly.

Therefore, in dream-time one may visit the future or the past during the course of the dream.

A fifth dimension of conscious-time, and a sixth dimension of dream-time creates a 6 dimensional time-space manifold. This would be conceptualized as three dimensions of space^2 minus the separation of -time^2, minus the separation of conscious-time ($-ct^2$) minus the separation of dream-time ($-dt^2$).

Dream-Time Of The Future

Because conscious-time and dream-time appear to have no significant mass or gravity they would not significantly affect, for example, the orbits of planets around stars, the orbit of this star around the Milky Way galaxy, and so on, except through entanglement and observation, in which case the effects outside of dream-time and conscious-time, would most likely be inconsequential or local.

A separation in conscious-time would include the "past," "present," and "future." In dream-time past-present-future and the three dimensions of space may exist simultaneously as a gestalt thereby violating all the rules of causality and the laws of physics. During dream-time events may occur in a logical or semi-logical temporal sequence, or they may be juxtaposed and make no sense at all. Because the future past present may exist simultaneously and as the future may be experienced in a dream during accelerated states of brain activity, then during dream consciousness the dreamer may get glimpses of future events which may occur within days, the next morning, or which may even trigger wakefulness. Access to the future occurs because dream-time takes place during an accelerated state of dream-consciousness and thus the future comes closer to the present and the dreamer arrives in the future in less time than those who are awake. In other words, just as increased velocity causes a contraction of space-time thereby decreasing the distance between the present and the future (Einstein 1961, Einstein et al. 2913), accelerated dream-consciousness has the same effect.

Dream-Time and the Many Worlds of Quantum Physics

In dream-time and dream-consciousness all worlds are possible simultaneously and in parallel. These many worlds include those of the future and the past and where time and space are juxtaposed and every probable outcome is equally likely, and where the world is continually splitting into

alternate worlds. Dream-time-consciousness is a manifestation of and in many respects obeys the laws of the "Many Worlds" theory of quantum physics as first proposed by Hugh Everett (1956, 1957).

Hugh Everett's "theory of the universal wavefunction" (Many Worlds) is distinguished from the Copenhagen model, as there is no special role for an observing consciousness. Everett also removed the "wave function" collapse which he believed to be redundant, and instead insisted that what is observed must be clearly defined (thereby answering one of Einstein's criticism of quantum theory). According to Everett's theory, every action, every measurements, every behavior, every choice, even not choosing, can create a new reality, another world, generating a bifurcation between what happened and what did not happen, such that innumerable possibilities and possible worlds arise from every action, including realties which do not obey the laws of physics and cause and effect

As conceived by Everett (1956, 1957) and Dewitt (1971), when a physicist measures an object, the universe splits into two distinct universes to accommodate each of the possible outcomes. In one universe, the physicist measures the wave form, in the other universe the physicist measures the object as a particle. Since all objects have a particle-wave duality, this also explains how an object can be measured as a particle and can be measured as a wave, but not both at the same time in the same world, and how it can be measured in more than one state, each of which exists in another world. The simple act of measurement creates two worlds both of which exist at the same time in parallel, and each separate version of the universe contains a different outcome of that event.

Instead of one continuous timeline, the universe under the many worlds interpretation looks more like a forest of trees with innumerable branches and twigs each of which represents a different possible world. According to Everett the entire universes continuously exists in a superposition and juxtaposition of multiple states. In many respects, Everett's theory defines dream-time and dream-consciousness.

According to Everett (1957), observation and measurement does not force the object under observation to take any specific form or to have any specific outcome. Instead, all outcomes are possible; much like a dream. For example, an NFL football player, a receiver, is running down the field and the quarterback throws him the ball. According to the "Many Worlds"

interpretation of quantum physics, every conceivable and incomprehensible outcome is possible: The receiver catches or doesn't catch the ball. A female cheerleader runs out into the field and catches the ball. The receiver and the cheerleader ignore the ball and take off their clothes and have sex on the field. The head coach takes out a shotgun and begins shooting at the football. Spectators run onto the football field and erect circus tents and it becomes a giant carnival with rides. Some of the football players dress up as clowns and circus performers. Players and spectators lay on the grass and swim toward the goal posts. An alien space ship crashes into the football stadium and aliens emerge selling popcorn. Terrorists attack the football players and steal the football, and so on.

All outcomes are possible in Multiple Worlds, ranging from the most probable, to the least probable (Dewitt 1971). Thus every probable outcome is possible; trillions of outcomes including those where the improbable, and in defiance of physics may become the law of the land. Moreover, each of these multiple realities exist, simultaneously, side-by-side, in parallel. They exist simultaneously with the reality in which the observer resides; and whatever reality houses the observer is just one probable reality.

PreCognition in Dream-Time and Dream-Consciousness

During dream-time and during dream-consciousness the reality being dreamed is characterized by every possible outcome. Some dream worlds exist in the future, others in the past, and yet others in a world where past, present and future are juxtaposed and exist simultaneously and where every possible outcome is possible. Thus, in dream-time, the dream-consciousness can witness any number of these possible worlds including those which exist in the future.

However, these futures and possible futures which are observed by dream-consciousness are not "just a dream." According to the Many Worlds interpretation, they actually exist. In terms of space-time, these future worlds exist in the future, in a distant location. As predicted by quantum mechanics, the observer is entangled with that future. However, in dream-time the observer (dream consciousness) directly observes that future; including those futures which are improbable or most probable.

The Many Worlds of dream-consciousness provides the foundation for dream-time precognition. The dreamer may dream of the future just before it

occurs. And upon waking from that dream of the future, the conscious mind may remember it and then experience it as it occurs in real time.

Dream-time access to the future is made possible because the brain is in a state of accelerated activity during the course of the dream. As predicted by Einstein (1961) an accelerated frame of reference brings the future closer to the present and makes time travel possible. Accelerated states of consciousness not only bring the future closer, but provide glimpses of those futures before they occur; a phenomenon best described as pre-cognition in dream time.

Aberfan Disaster Dream-Time Precognition

Aberfan is a small village in South Wales. Throughout late September and October 1966, heavy rain lashed down on the area and seeped into the porous sandstone of the hills which surrounded the town and against which abutted the village school (Barker 1967).

On September 27 1966, Mrs SB of London dreamed about a school on a hillside, and a horrible avalanche which killed many children.

On October 14, 1966 Mrs GE from Sidcup, dreamed about a group of screaming children being covered by an avalanche of coal.

On October 20, 1966 Mrs MH, dreamed about a group of children who were trapped in a rectangular room and the children were screaming and trying to escape.

On October 20, 1966, a 10 year old child living in Aberfan woke up screaming from a nightmare. She told her parents that in her dream she was trying to go to school when "something black had come down all over it" and there was "no school there."

On October 21, 1966, part of the rain soaked hills of Aberfan gave way and half a million tons of debris slid toward the village of Aberfan and slammed into the village school. The 10 year old girl who dreamed of the tragedy and 115 other schoolchildren and 28 adults lost their lives when the school was smashed and covered with mud. There were less than a dozen survivors (Baker, 1967).

Assassination of Archduke Francis Ferdinand: Dream-Time Precognition

In June of 1914, Austria was seeking to expand it's central European empire; plans which were resented by neighboring states, including Serbia,

who wished to remain independent. That same month, the Archduke Francis Ferdinand, nephew of the Austrian Emperor Francis Joseph, went on a diplomatic tour accompanied by his wife, to build alliances with the leaders of these independent nations. In late June he and his wife arrived in Sarajevo, Serbia.

On the evening of June 27, 1914, Bishop Joseph Lanyi prepared for bed and upon falling asleep he began to dream. The Archduke Franz Ferdinand of Austria, heir to the throne of Austria, had been the Bishop's student and pupil, and late that night the Archduke appeared in Bishop Lanyi's dream. The dream became a nightmare and at 3:15 AM Bishop Joseph Lanyi awoke, frightened, upset and in tears. He glanced at the clock, dressed himself, and because the dream was so horrible, he wrote it down:

"At a quarter past three on the morning of 28th June, 1914, I awoke from a terrible dream. I dreamed that I had gone to my desk early in the morning to look through the mail that had come in. On top of all the other letters there lay one with a black border, a black seal, and the arms of the Archduke. I immediately recognized the letter's handwriting, and saw at the head of the notepaper in blue colouring a picture which showed me a street and a narrow side-street. Their Highnesses sat in a car, opposite them sat a General, and an Officer next to the chauffeur. On both sides of the street there was a large crowd. Two young men sprang forward and shot at their Highnesses."

In the dream, Bishop Lanyi read the dream-letter, which had been written by the Archduke. According to the Bishop's account, which he wrote down in the early predawn hours of June 28, the dream letter from the Archduke was as follows: "Dear Dr Lanyi: Your Excellency. I wish to inform you that my wife and I were the victims of a political assassination. We recommend ourselves to your prayers. Cordial greetings from your Archduke Franz. Sarajevo, 28th June, 3.15 a.m."

Bishop Joseph Lanyi was convinced that the Archduke had been assassinated, and called his parishioners and household staff to tell them of the terrible news. Later that morning of June 28, 1914, the Bishop held a mass for the Archduke and his wife. But, the Archduke were still alive and would not be shot dead for another 2 hours.

On June 28, 1914, at 11 a.m., as the Archduke and his wife were leaving a ceremony at Sarajevo, a Serbian nationalist leaped from the crowd and killed them both. It was the Archduke's assassination which triggered World War

One.

Death of Mark Twain's Brother: Dream-Time Precognition

In May of 1858, Mark Twin had a dream about his younger brother Henry who was working on a riverboat as a "mud clerk." As related by Mark Twain:

"The dream was so vivid, so like reality, that it deceived me, and I thought it was real. In the dream I had seen Henry a corpse. He lay in a metallic [burial case]. He was dressed in a suit of my clothing, and on his breast lay a great bouquet of flowers, mainly white roses, with a red rose in the [centre]. The casket stood upon a couple of chairs...it suddenly flashed upon me that there was nothing real about this--it was only a dream. I can still feel something of the grateful upheaval of joy of that moment, and I can also still feel the remnant of doubt, the suspicion that maybe it [was] real, after all. I returned to the house almost on a run, flew up the stairs two or three steps at a jump, and rushed into that [sitting-room]--and was made glad again, for there was no casket there."

A few days later, Twain's brother left on a river boat from New Orleans. As related by Mark Twain:

"Two or three days afterward the boat's boilers exploded at Ship Island, Memphis. I found Henry stretched upon a mattress on the floor of a great building, along with thirty or forty other scalded and wounded persons... his body was badly scalded... I think he died about dawn. The coffins provided for the dead were of unpainted white pine, but in this instance some of the ladies of Memphis had made up a fund of sixty dollars and bought a metallic case, and when I came back and entered the [dead-room] Henry lay in that open case, and he was dressed in a suit of my clothing. He had borrowed it without my knowledge during our last sojourn in St. Louis; and I recognized instantly that my dream of several weeks before was here exactly reproduced, so far as these details went--and I think I missed one [detail;] but that one was immediately supplied, for just then an elderly lady entered the place with a large bouquet consisting mainly of white roses, and in the [centre] of it was a red rose, and she laid it on his breast."

The Dream-Murder of Tanya Zachs

In a legal case investigated and reported by Joseph (2000), a beautiful young woman, Tanya Zachs, disappeared on her way home in San Jose from

her job in Santa Cruz in September of 1984. Her car was found abandoned along highway 17 midway between the two cities and which courses through the Santa Cruz mountains. That night, a young woman "Sunshine" who lived in a nudist colony, Lupin Lodge, situated in the Santa Cruz Mountains, had a nightmare: A woman was being brutally murdered. The next day, Sunshine read the story of Tanya's disappearance in the local newspaper, and that night she had the dream again, but this time the victim appeared to her quite clearly. It was Tanya.

In the dream Tanya showed "Sunshine" a narrow mountain road off highway 17, one of many leading from the long and winding highway between San Jose and Santa Cruz. Tanya led the dreamer down the mountain road which was bordered by a thick canopy of redwood trees and pines, and then to an isolated spot alongside. Tanya then beckoned the dreamer to follow her down a rather steep incline leading from the mountain road into the forest and thick brush, and then along a forested trail. Finally, Tanya stopped and pointed out her naked body, lying spread eagle on a huge slab of rock surrounded by trees.

Sunshine was convinced she knew where Tanya's body lay hidden. On the morning of 9/15/84, she contacted Tanya's family, told them of her dreams, and that same day led them and the police to the mountain side road Tanya had showed her and finally to the isolated spot. The police climbed down the tree-covered steep incline, and just as Sunshine had dreamed, they found the trail leading into the forest. But, there was no body.

That night Sunshine had another dream and Tanya took her to the same spot, down the same trail, then pointed at and emphasized a little deer trail that forked off to the right between the trees, and which led directly to her body. The next day, Sunshine and the family met again, and then climbed down the incline, took the trail to the right, and there was Tanya's body laid out exactly as revealed to Sunshine when dreaming.

The murder remained unsolved, however, until four years later. Damon Wells, beset by horrible nightmares where the victim kept accusing him of her murder, sought psychiatric treatment and confessed (Joseph 2000).

Precognition Dreams Are Common

Precognition dreams are common (Fukuda 2002; Haraldsson, 1985; Lange et al. 2001; Ross & Joshi, 1992; Stowell, 1995; Thalbourne, 1994) and often

involve negative, unhappy, unpleasant events such as deaths, disasters and other calamities (Ryback & Sweitzer, 1990). About 40% of precognitive dreams are linked to an event the following day (Sondow, 1988), or take place several days or weeks later. However, anecdotal evidence indicates that the dreamed events may occur just prior to waking, even triggering wakefulness.

Precognition dreams can be about mundane affairs of concern only to the dreamer. A colleague of this author admits to frequently having had precognitive dreams and relates the following: “I dreamed that my water heater busted and that water was flooding out onto the floor. Three days later, the water heater sprung a leak.” “I dreamed about getting a flat tire while driving on the freeway. It was the rear tire on the driver’s side. A couple days later, the car’s dashboard-computer informed me that the rear tire on the driver’s side was low in air.” “I dreamed that I took a girlfriend to my hot tub in the back yard, but it was empty and there was no water. When I tried to turn the water on nothing would happen. In the dream I was irritated because it would have to be replaced. A few days later the hot tub on-switch broke and after several failed attempts to fix it, I had it junked.”

Several studies indicate that precognitive dreams are more common in younger than older individuals and that women report more precognitive dreams than men (Lange et al. 2001). It has also been found that those who have experienced deja vu are more likely to have precognitive dreams (Fakuda, 2002).

In large samples, anywhere from 17.8 % to 66% of individuals report that they experienced at least one precognitive dream (Fukuda 2002; Palmer, 1979; Haraldsson, 1985; Ross & Joshi, 1992; Ryback, 1988; Thalbourne, 1994) whereas over 60% of the general population believe such dreams are possible (Thalbourne, 1984; Haraldsson, 1985). However, Ryback (1988) after investigating 290 case reports of paranormal dreams, dismissed most of these precognitive dreams as coincidence and concluded that only 8.8% of the population actually have these dreams.

The Big Dream

Precognitive dreams have been reported throughout history, with accounts even appearing in the ancient Babylonian epic of Gilgamesh. Among ancient societies dreams were seen as extremely important sources of information

about the future. In the ancient world, be it Greek, Rome, Egypt, or Babylon, it was not uncommon for someone to have what is called “a big dream” which was of great importance to the whole tribe, city, or nation (Campbell 1988; Frazier 1950; Freud 1900; Jung 1945, 1964; Malinowkski 1954). As possible harbingers of the future, these dreams had to be analyzed most carefully and the populace would gather around the man or woman who had the big dream and then debate its message and what do do about it. “Big Dreams” were even announced two thousand years ago in the Roman Senate. However, there were many who were non-believers.

PreCognitive Dream Skepticism and Professional Baseball

Over 2000 years ago Aristotle wrote a book expressing his disbelieve in precognitive dreams: “On Divination in Sleep.” Aristotle complained that most of those having precognitive dreams were unworthy of the honor of receiving advanced information and “are not the best and wisest, but merely commonplace persons.” Aristotle argued that “the sender of such dreams should be God.” According to Aristotle “most dreams are to be classed as mere coincidences...” and do not take “place according to a universal or general rule” and have no causal connection to actual events in the future.

“Coincidence” has been the major objection to claims of precognitive dream activity (Caroll 2000; Wiseman 2011). Caroll (2000) refers to the “law of large numbers” and dismisses all claims as being a function merely of coincidence. For example, the odds, are with so many dreamers having dreams about so many different themes, that a few of them will have dreams about an airplane crash or a ship that sinks. If the next day a ship sinks or a plane crashes, this is merely coincidence. According to Caroll and others, if precognitive dreams were real, they should be more commonplace, with more dreamers coming forward, and thus there should be a high “hit rate” and there is not; and as such “precognitive dreams do not exist.”

However, if we applied the same reasoning to professional baseball, then professional baseball does not exist. Consider, from 2000 until 2013, the average baseball batting average ranged around 267. During regular season play during 2013, out of 750 major league players, 726 had a batting average of less than 30% (http://espn.go.com/mlb/stats/batting). Taking into considering fowl balls and hits which result in “outs”, but considering that each player has at least 3 opportunities each time at bat to hit the ball, and

then taking that .267 average, it could be said that the average professional baseball player actually gets a base hit less than 20% of the time. Be it a 20% or 30% hit rate, obviously this does not mean no one in professional baseball is able to hit the ball, or that when they do it is merely a coincidence. The same standard must be applied to precognitive dreams.

Precognitive dreams need not be about Earth-shaking national tragedies and it is unknown how many dreamers would ever come forward to report their dreams even if they did have national implications. In fact, most dreams are forgotten upon waking (Frank, 2012, Pagel, 2014, Stickgold & Walker, 2010). Further, many precognitive dreams may be related to mundane matters like a "flat tire," or a phone call or visit from a friend the next day; or they may be entangled with events which are about to occur just minutes or seconds into the future, i.e. backward/precognitive dreams.

Since most people forget their dreams upon waking and most dreams are forgotten, how often precognitive dreaming occurs, and how many people have them, is unknown. What is known is that such dreams can be explained by quantum physics and the neurological foundations for dream activity and dream-time.

PreCognitive Backward Dreams

Precognitive experiences occurring during waking may be entangled with innocuous event which are just about to occur, such as thinking of a friend and then getting a phone call or email from that friend minutes or hours later. Just as a professional baseball player is more likely to swing and miss than hit the ball, the fact that one might think of a friend who does not call is not evidence against precognition.

During accelerated states associated with dream-time, precognitive dreams may be for events which will soon happen, or are just about to happen, perhaps seconds, or minutes away. These latter-type of dreams care best described as precognitive-backward dreams.

A case in point, "Katherine" dreams she and a friend "Sheryl" are shopping in Boston. They go from store, lugging shopping bags. "Katherine" in her dreams feels this sense of urgency to go home as if she is late for something and someone is waiting for her so she sets her bags down on the sidewalk and sits on a bench to wait for a cab or a the bus. She then realized her friend "Sheryl" is gone. Katherine looks for her, goes in and out of stores,

but can't find her. "Katherine" sees a bus-like street car coming down the cobbled street and she picks up her packages and steps out onto the curb. As the street car pulls up and stops "Katherine" is surprised to see that Sheryl is driving and is ringing its bell. The sound of the bell grows louder and louder and then jolts "Katherine" from her dream. Katherine realizes that her phone is ringing. She picks it up and it is her friend "Sheryl" who is calling. Sheryl and Katherine are going shopping that day.

That "Katherine" dreamed about going shopping with "Sheryl" is not remarkable in-itself. That "Sheryl" was ringing the bell and it was Sheryl who was calling can be explained away as interesting coincidence. It is no surprise that Sheryl called. What seems paradoxical, however, is that the dream of shopping and walking down the streets of Boston laden with packages, the desire to go home, then looking for her missing friend and then seeing the bus-like street car all seemed to lead up to the ringing of the bell in a logical order of events so that its ringing made sense in the context of the dream. Hearing the ringing bell seemed to be a natural part of the dream, and it is. However, the dream did not lead up to the bell. Rather, the ringing of the bell initiated the dream. The effect (ringing bell) and the cause (the ringing phone) are identical. The effect caused itself.

There are two explanations for these quite common "backward" dreams. Dream-time and dream-consciousness does not obey the laws of physics. In dream-time, dream-consciousness may attempt to impose temporal order on a dream which has no temporal order and which may be experienced as a gestalt. In other words, in dream-time the entire dream was instantaneous and the dream was initiated by the ringing of her phone. The bell was heard and the dream was instantly produced in explanation and association. Future, present, past may be juxtaposed and experienced as a gestalt; like seeing the forest instead of the individual trees. In fact, although dreams may seem to last long time periods, they may be only seconds in length (Frank, 2012, Pagel, 2014, Stickgold & Walker, 2010).

The other explanation is that the ringing of the phone and the fact that Sheryl was calling Katherine, was perceived in dream-time, before it happened. Just as a time-machine traveling at superluminal speeds from the future into the past will pass by an observer only to be followed by its light image (which trails behind at the speed of light), information just seconds or minutes away into the future can be perceived by dream-consciousness in

dream-time through entanglement. However, it is not future information traveling at superluminal speeds, but the mind and brain of the dreamer which are accelerating toward that future event in advance of those conscious minds which are still awake.

In dream time, the brain is highly active (Frank, 2012, Pagel, 2014, Stickgold & Walker, 2010), and certain regions in the limbic system are hyperactive (Joseph 1992, 1996, 2000). During dream-time, brain activity is accelerating which causes a contraction in time-space. The future comes closer to the present during dream time relative to outside observers which may include, upon waking, the conscious mind of the dreamer. However, while in dream-time, in a state of accelerated dream-consciousness, the future may be sensed and it may trigger a complex dream which then leads up to that future event when it arrives in the present thereby waking the dreamer.

Another illustrative example: French physicist Alfred Maury dreamt that he had taken part in the French Revolution and that he had been condemned to death and his head cut off at the exact moment when his bedpost broken and struck him across the neck:

"I was rather,unwell, and was lying down in my room, with my mother at my bedside. I dreamed of,the Reign of Terror; I witnessed massacres, I was appearing before the Revolutionary,tribunal, I saw Robespierre, Marat, Fouquier-Tinville, all the most wicked figures of,that terrible era; I talked to them; finally, after many events that I only partly remember,,I was judged, condemned to death, taken out in a tumbril through a huge throng to the,Place de la Revolution; I mounted the scaffold; the executioner tied me to that fatal,plank, he tipped it up, the blade fell; I felt my head separating from my body, I woke up,racked by the deepest anguish, and felt the bedpost on my neck. It had suddenly come,off and had fallen on my cervical vertebrae just like the guillotine blade."

Certainly it would be expected that a major blow to the head and neck would cause instant waking. But in this instance, it did not. Instead, the dreamer experienced a long and convoluted dream which was initiated by what was about to happen, and which could also be considered a warning of what was about to happen; albeit in the unique dream-language characteristic of dreams. This is not a case of an instantaneous backward dream, but a precognitive dream which provided the dreamer with a glimpse of what lay in store just moments into the future.

A third example related by a colleague: “I’d been working in my yard into the late afternoon and was exhausted. It was hot and I stripped off my shirt and lay down in a swinging hammock in my yard to take a nap, fell asleep and began to dream. In the dream I was in a nightclub and there was this exotic beautiful woman with long black hair drinking at the bar. We began drinking together and then we were dancing and kissing and then we were suddenly in my house and we were laying on the floor and I was taking off her clothes and she was getting very excited and aggressive. All at once I could see she had yellow eyes and black skin, but it wasn’t skin, but resembled an insect’s chitlin. Her arms and hands became claws and her teeth became razor sharp and pointed. She put her claw arms around me very tight as I struggled to escape. She had turned into some demonic insect-creature and pressed her razor sharp claw-hands into my back. I could feel her razor sharp claws knifing me and I felt I was being stabbed in the back. The pain was terrible. It seemed as if her pointed claws were going to completely pierce my back and come out my chest. The pain was so horrific I woke up. But the pain was still there. I got up from the hammock and there was a crippled black bumble bee laying there. The damn thing has stung me on my back.”

Dreams that seem to paradoxically lead up to an event which wakes the dreamer are common. These dreams may be relatively brief or become lengthy complicated dreams leading up to some event which then occurs, as if on cue, waking the dreamer who discovers upon waking that someone was knocking on his door, the phone was ringing, it was the alarm clock, a kid was yelling outside the window, and so on, all of which initiated the dream which then led up to the event which caused the dream (Joseph 1992). The dream was produced, so as to explain in the unique language of the dream what was about to happen; and this is because, it already happened in the future. The only other explanation is the dream was produced as an instant gestalt and the dreamer dreamed the dream in accelerated dream-time without any temporal order, and it was upon waking that the dream was reconstructed in a temporal sequential time frame (Joseph 1992).

Be they backward dreams instantly produced as a gestalt, or examples of dream precognition, backward dreams are the most easily comprehended because the conscious mind utilizes temporal sequences to explain what is observed, and may recall the dream in reverse, so it makes temporal-

sequential sense; as if the cause led to the effect, when the cause and effect were either simultaneous, or the effect was its own cause.

Joseph Dreams His Death 2000 Years Ago?

In the early 1950s, when I [R. Joseph] was a boy of 3, and for many years until around age 7, I had dreams about a little boy playing by the sea shore, by the ocean. And there were crowds of people. Some lying or sitting together on the sand. Others swimming or fishing. And then in the dream the ocean began to recede... the ocean waters drew back back back... and I could see shells and fish flopping on the wet sand where moments before there had been ocean... and ships and small boats lay on their sides... and I ran to where the ocean had been, on the wet sand, picking up shells... and many other people also ran onto the wet sand picking up wiggling fish and laughing and talking in amazement that the ocean had pulled back for miles and miles leaving the sand and ocean floor completely revealed for everyone to see.... and then... and then... and then...

I walked further and further out to where the ocean had been, picking up giant shells some with wiggling living creatures still inside, and gazing in wonder at what the ocean had hidden but which was now revealed… and then I heard screams... women and men and children were screaming... and in my dream, they were all running from the wet sand where the ocean had been toward the dry shore...and people on the shore were also running... everyone was running away and screaming... and I could hear this rumbling roar from behind me… and when I looked back to see why, what they were running from and what was making that roar, I could see the ocean... it was still miles away--but it was a WALL OF OCEAN.. a WALL OF WATER looming up maybe 100 yards perhaps even miles into the sky... and in my dream the wall of ocean was rushing forward, to where the ocean had been minutes before, toward where I was standing with sea shells in my hands... and I started running... like everyone else, running running running... and I could see, over my shoulder, behind me, the roaring wall of ocean water coming closer, and closer... and faster faster faster... and I kept running... everyone was running and screaming...trying to get away... and then the towering WALL OF WATER was just behind me... then looming over me... and then it crashed down upon me... and the little boy that I was, in this dream, drowned.... and then I awoke in my bed... the same boy who drowned, but a different

boy...me...

I had this dream over and over for years; the same dream, the source of which was a mystery to me as I had never even imagined that the ocean could actually recede and then rush back to land as I had dreamed. It was not until 20 years later that I learned, for the first time, about Tsunamis and how characteristic it is for people to foolishly run out to where the ocean and been… and then... the ocean comes rushing back as a wall of water drowning everyone who did not immediately run away.

How could I have dreamed so vividly about something 3-year old me knew nothing about in the early 1950s when we didn't even have a television? There were clues in yet other dreams when I was a child, and they were dreams of the same little boy. But it was during ancient Roman times, and I was sitting with my mother who was dressed in royal robes typical of the Roman period. She was singing to me… And down below I could see Roman soldiers marching, and peasant women by a river, washing clothes, and the river was flowing into the ocean. The peasant women, who had with them many naked children, were dressed in clothes I associated with Biblical times, of ancient Egypt; my grandmother would often read to me from a Bible picture book. But in these river-side dreams which began so peaceful, they all ended with incredible earthquakes, like the world was turning up-side down...

How do these two dreams relate? Almost 50 years after I had these dreams, I searched the records for Tsunamis in the Mediterranean sea near Italy and Egypt.

On the morning of July 21, 365 AD, an earthquake of great magnitude caused a huge tsunami more than 100 feet high and it inundated and destroyed several towns on the coasts of the Mediterranean, including Alexandria. This is how Ammianus Marcellinus, a Roman historian described it:

Slightly after daybreak, and heralded by a thick succession of fiercely shaken thunderbolts, the solidity of the whole earth was made to shake and shudder, and the sea was driven away, its waves were rolled back, and it disappeared, so that the abyss of the depths was uncovered and many-shaped varieties of sea-creatures were seen stuck in the slime; the great wastes of

those valleys and mountains, which the very creation had dismissed beneath the vast whirlpools, at that moment, as it was given to be believed, looked up at the sun's rays. Many ships, then, were stranded as if on dry land, and people wandered at will about the paltry remains of the waters to collect fish and the like in their hands; then the roaring sea as if insulted by its repulse rises back in turn, and through the teeming shoals dashed itself violently on islands and extensive tracts of the mainland, and flattened innumerable buildings in towns or wherever they were found. Thus in the raging conflict of the elements, the face of the earth was changed to reveal wondrous sights. For the mass of waters returning when least expected killed many thousands by drowning, and with the tides whipped up to a height as they rushed back, some ships, after the anger of the watery element had grown old, were seen to have sunk, and the bodies of people killed in shipwrecks lay there, faces up or down.

Had Joseph dreamed of a previous life from nearly 2000 years ago? Or did he journey to the past, during dream-time, and visit the long ago in the time machine of consciousness?

The ancients believed the past could be accessed through dreams. But according to general relativity and quantum physics, time reversal is possible only at superluminal speeds.

Quantum Physics of Dream-Time and Dream Consciousness

Dream-consciousness and dream-time are associated with accelerated levels of brain activity. Relativity predicts that observers with an accelerated frame of reference experience time-contraction and a shrinking of time-space such that the future and the present come closer together relative to those with a different frame of reference. Not surprisingly, two dissociated conscious minds may experience slowing and speeding up simultaneously. However, space-time is also part of the quantum continuum; and this continuum extends into the future and the past, such that all are entangled.

As based on a coupling of the Copenhagen with the Many Worlds interpretations, dream-consciousness can become entangled with the space-time continuum which includes the various futures as they flow toward an observer; futures which are also entangled and which will become modified to varying degrees before being perceived and then upon the act of

registration. Thus, during dream consciousness, not just the most improbable, but also the most probable future world may be observed; a probable future which may or may not happen in this reality, in this world, but which will or has happened in another world as predicted by "Many Worlds."

Dream-consciousness, and dream-time, because they are maintained by brain structures which, during sleep, are freed of inhibitory restraint, also have a sensitivity to the quantum continuum which differs from and is more wide-reaching than the mind during waking. Much of the human brain is subject to inhibition, which prevents sensory overload and allows for the focusing of attention. However, if that inhibition is removed, specific neurons and brain areas may greatly increase their activity and begin processing information which is normally filtered from the conscious mind.

Einstein proclaimed that the "distinctions between past, present and future are an illusion," that time is embedded with space, creating a space-time manifold where numerous futures, pasts, presents overlap and exist simultaneously in parallel, all flowing in various directions relative to observers. The future, or rather, multiple futures exist, albeit in varying distant locations in space-time. All of space-time, the quantum continuum, is entangled, and just as the ripples of a pond may strike distant shores, the space-time quantum states of the future may also effect distant shores occupied by what the mind experiences as the now.

If the 4th dimension is space-time, and if the future and the present and differences in time are related to accelerated frames of reference and movement through space, then within the quantum continuum, everything is connected: stars, planets, dogs, cats, past, present, and the future.

Be it the time traveler who accelerates toward light speed and then to superluminal velocities, such that he first travels to the future and then the past, the time machine of consciousness, freed of inhibitory restraint, may also accelerate toward light speed, lifting the veil and enabling the dreaming mind to see what had been concealed including what may occur in the future and what may have taken place thousands of years ago in the past.

REFERENCES

Al-Khalili (2011). Black Holes, Wormholes and Time Machines, Taylor & Francis.

Almheiri, A. et al. (2013). Black Holes: Complementarity or Firewalls? J.

High Energy Phys. 2, 062

Bethe, H. A., et al., (2003) Formation and Evolution of Black Holes in the Galaxy, World Scientific Publishing.

Bilaniuk, O.-M. P.; Sudarshan, E. C. G. (1969). “Particles beyond the Light Barrier”. Physics Today 22 (5): 43–51.

Bo, L., Wen-Biao, L. (2010). Negative Temperature of Inner Horizon and Planck Absolute Entropy of a Kerr Newman Black Hole. Commun. Theor. Phys. 53, 83–86.

Bohr, N., (1913). “On the Constitution of Atoms and Molecules, Part I”. Philosophical Magazine 26: 1–24.

Bohr, N., (1913). “On the Constitution of Atoms and Molecules, Part I”. Philosophical Magazine 26: 1–24.

Bohr, N. (1934/1987), Atomic Theory and the Description of Nature, reprinted as The Philosophical Writings of Niels Bohr, Vol. I, Woodbridge: Ox Bow Press.

Bruno, N. R., (2001). Deformed boost transformations that saturate at the Planck scale. Physics Letters B, 522, 133-138.

Blandford, R.D. (1999). “Origin and evolution of massive black holes in galactic nuclei”. Galaxy Dynamics, proceedings of a conference held at Rutgers University, 8–12 Aug 1998,ASP Conference Series vol. 182.

Carroll, S (2004). Spacetime and Geometry. Addison Wesley.

Casimir, H. B. G. (1948). “On the attraction between two perfectly conducting plates”. Proc. Kon. Nederland. Akad. Wetensch. B51: 793.

Chodos, A. (1985). “The Neutrino as a Tachyon”. Physics Letters B 150: 431.

Einstein, A. (1915a). Fundamental Ideas of the General Theory of Relativity and the Application of this Theory in Astronomy, Preussische Akademie der Wissenschaften, Sitzungsberichte, 1915 (part 1), 315.

Einstein, A. (1915b). On the General Theory of Relativity, Preussische Akademie der Wissenschaften, Sitzungsberichte, 1915 (part 2), 778–786.

Einstein A. (1939) A. Einstein, Ann. Math. 40, 922.

Einstein, A. (1961), Relativity: The Special and the General Theory, New York: Three Rivers Press.

Einstein, A. and Rosen, N. (1935). “The Particle Problem in the General Theory of Relativity”. Physical Review 48: 73.

Einstein, A., Lorentz, H.A., Minkowski, H., and Weyl, H. (1923). Arnold

Sommerfeld. ed. The Principle of Relativity. Dover Publications: Mineola, NY. pp. 38–49.

Einstein A, Podolsky B, Rosen N (1935). “Can Quantum-Mechanical Description of Physical Reality Be Considered Complete?”. Phys. Rev. 47 (10): 777–780.

Eisberg, R., and Resnick. R. (1985). Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles. Wily,

Everett, A., & Roman, T. (2012). TIme Travel and Warp Drives, University Chicago Press.

Feinberg, G. (1967). “Possibility of Faster-Than-Light Particles”. Physical Review 159 (5): 1089–1105.

Fuller, Robert W. and Wheeler, John A. (1962). “Causality and Multiply-Connected Space-Time”. Physical Review 128: 919.

Garay, L. J. (1995). Quantum gravity and minimum length Int.J.Mod.Phys. A10 (1995) 145-166

Ghez, A. M.; Salim, S.; Hornstein, S. D.; Tanner, A.; Lu, J. R.; Morris, M.; Becklin, E. E.; Duchene, G. (2005). “Stellar Orbits around the Galactic Center Black Hole”. The Astrophysical Journal 620: 744.

Geiss, B., et al., (2010) The Effect of Stellar Collisions and Tidal Disruptions on Post-Main-Sequence Stars in the Galactic Nucleus. American Astronomical Society, AAS Meeting #215, #413.15; Bulletin of the American Astronomical Society, Vol. 41, p.252.

Giddings, S. (1995). The Black Hole Information Paradox,” Proc. PASCOS symposium/Johns Hopkins Workshop, Baltimore, MD, 22-25 March, 1995, arXiv:hep-th/9508151v1.

Hawking, S. W., (1988) Wormholes in spacetime. Phys. Rev. D 37, 904–910.

Hawking, S., (1990). A Brief History of Time: From the Big Bang to Black Holes. Bantam.

Hawking, S. (2005). “Information loss in black holes”. Physical Review D 72: 084013.

Hawking, S. W. (2014). Information Preservation and Weather Forecasting for Black Holes.

Heisenberg, W. (1927), “Über den anschaulichen Inhalt der quantentheoretischen Kinematik und Mechanik”, Zeitschrift für Physik 43 (3–4): 172–198.

Heisenberg. W. (1930), Physikalische Prinzipien der Quantentheorie (Leipzig: Hirzel). English translation The Physical Principles of Quantum Theory, University of Chicago Press.

Heisenberg, W. (1955). The Development of the Interpretation of the Quantum Theory, in W. Pauli (ed), Niels Bohr and the Development of Physics, 35, London: Pergamon pp. 12-29.

Heisenberg, W. (1958), Physics and Philosophy: The Revolution in Modern Science, London: Goerge Allen & Unwin.

Jaffe, R. (2005). "Casimir effect and the quantum vacuum". Physical Review D 72 (2): 021301.

Joseph, R (2010a) The Infinite Cosmos vs the Myth of the Big Bang: Red Shifts, Black Holes, and the Accelerating Universe. Journal of Cosmology, 6, 1548-1615.

Joseph, R. (2010b). The Infinite Universe: Black Holes, Dark Matter, Gravity, Acceleration, Life. Journal of Cosmology, 6, 854-874.

Joseph, R. (2014a) Paradoxes of Time Travel: The Uncertainty Principle, Wave Function, Probability, Entanglement, and Multiple Worlds, Cosmology, 18, 282-302.

Joseph, R. (2014a) The Time Machine of Consciousness, Cosmology, 18, In press.

Kerr, R P. (1963). "Gravitational Field of a Spinning Mass as an Example of Algebraically Special Metrics". Physical Review Letters 11 (5): 237–238.

Lambrecht, A. (2002) The Casimir effect: a force from nothing, Physics World, September 2002

Lorentz, H. A. (1892), "The Relative Motion of the Earth and the Aether", Zittingsverlag Akad. V. Wet. 1: 74–79

McClintock, J. E. (2004). Black hole. World Book Online Reference Center. World Book, Inc.

Melia, F. (2003). The Edge of Infinity. Supermassive Black Holes in the Universe. Cambridge U Press. ISBN 978-0-521-81405-8.

Melia, F. (2007). The Galactic Supermassive Black Hole. Princeton University Press. pp. 255–256.

Merloni, A., and Heinz, S., (2008) A synthesis model for AGN evolution: supermassive black holes growth and feedback modes Monthly Notices of the Royal Astronomical Society, 388, 1011 1030.

Minchin, R. et al. (2005). "A Dark Hydrogen Cloud in the Virgo Cluster".

The Astrophysical Journal 622: L21–L24.

Morris, M. S. and Thorne, K. S. (1988). “Wormholes in spacetime and their use for interstellar travel: A tool for teaching general relativity”. American Journal of Physics 56 (5): 395–412.

O’Neill, B. (2014) The Geometry of Kerr Black Holes, Dover

Penrose, R. (1969) Rivista del Nuovo Cimento.

Preskill, J. (1994). Black holes and information: A crisis in quantum physics”, Caltech Theory Seminar, 21 October. arXiv:hep-th/9209058v1.

Pollack, G. L., & Stump, D. R. (2001), Electromagnetism, Addison-Wesley.

Rindler, W. (2001). Relativity: Special, General and Cosmological. Oxford: Oxford University Press.

Rodriguez, A. W.; Capasso, F.; Johnson, Steven G. (2011). “The Casimir effect in microstructured geometries”. Nature Photonics 5 (4): 211–221.

Ruffini, R., and Wheeler, J. A. (1971). Introducing the black hole. Physics Today: 30–41.

Russell, D. M., and Fender, R. P. (2010). Powerful jets from accreting black holes: Evidence from the Optical and the infrared. In Black Holes and Galaxy Formation. Nova Science Publishers. Inc.

Schrödinger, E. (1926). “An Undulatory Theory of the Mechanics of Atoms and Molecules”. Physical Review 28 (6): 1049–1070. Bibcode:1926PhRv...28.1049S. doi:10.1103/PhysRev.28.1049.

Sen, A. (2002) Rolling tachyon,” JHEP 0204, 048

Slater, J. C. & Frank, N. H. (2011) Electromagnetism, Dover.

Smolin, L. (2002). Three Roads to Quantum Gravity. Basic Books.

Taylor, E. F. & Wheeler, J. A. (2000) Exploring Black Holes, Addison Wesley.

Thorne, K. (1994) Black holes and time warps, W. W. Norton. NY.

Thorne, K. S. & Hawking, S. (1995). Black Holes and Time Warps: Einstein’s Outrageous Legacy, W. W. Norton.

Thorne, K. et al. (1988). “Wormholes, Time Machines, and the Weak Energy Condition”. Physical Review Letters 61 (13): 1446.

Wilf, M., et al. (2007) The Guidebook to Membrane Desalination Technology: Reverse Osmosis, Balaban Publishers.

16. Accelerated Dream-Consciousness: Entangled Minds

Rhawn Joseph, Ph.D.
BrainMind.com / Cosmology.com

Up to five stages of sleep have been identified in humans (Frank, 2012, Pagel, 2014, Stickgod & Walker, 2010). For our purposes we will be concerned only with two distinct sleep states. These are the REM (rapid eye movement) and nonREM periods. NonREM occurs during a stage referred to as "slow-wave" or synchronized sleep. It is during non-REM that the brain is at its lowest level of activity.

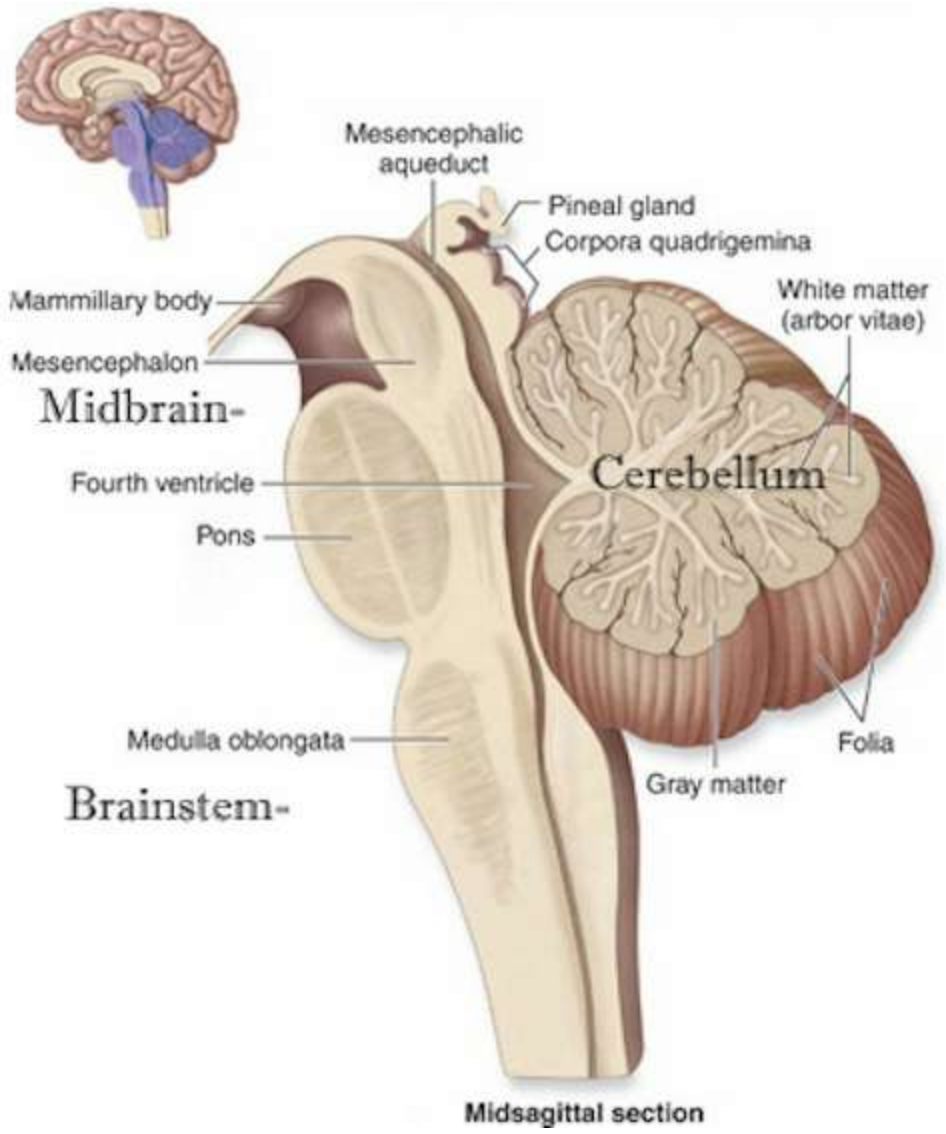
By contrast, REM is linked with the visual-emotional hallucinatory aspects of dreaming and both are associated with the deepest stage of sleep, characterized by "paradoxical" fast irregular wave activity (Cartwright 2007; Hobson 2004; Mallick et al. 2011). Dream sleep is called "paradoxical," for electrophysiologically the brain is in a state of accelerated activity and a heightened level of arousal, as demonstrated by electrophysiological indices (Steriade & McCarley, 2005; Vertes 1990). However, the body musculature is paralyzed so the ability to interact physically with one's dreams, in the real world, is greatly attenuated if not impossible. Otherwise, one would be acting our their dreams by moving around, and then hurting themselves or others.

As predicted by Einstein's relativity, under accelerated states space-time and the distance between the future and the present contracts (Einstein et al. 1923, Einstein 1961). Therefore, because of these heightened states of accelerated arousal during dream sleep, dream-consciousness may be provided glimpses of the future before that future arrives in space-time external to dream-consciousness; and this is because dream-time takes place during an accelerated state as reflected by brain activity.

Brain structures involved in the production of REM and paradoxical sleep include the amygdala, hippocampus, right temporal lobe, and especially reticular activating system and the lateral and medial pons which are located in the brainstem (Joseph 2012, Hobson et al. 2000; Hobson & Allan 2010). For example, brainstem cholinergic neurons located in the lateral pons, and neurons located in the medial pontine reticular formation appear to be the

locus for REM-on neurons which initiate and/or maintain the production of REM and dream sleep (Aeschbach 2011; Steriade & McCarley, 2005; Vertes 1990). Cholinergic neurons release excitatory neurotransmitters such as acetylcholine (ACh) which also activates the parasympathetic nervous system which is also involved in arousal (Joseph 2012). ACh levels remain at high levels during REM and the production of PGO waves by the pontine, lateral geniculate, occipital brain areas (Hobson, et al., 1975; Lydic, et al., 1991; Steriade & McCarley, 2005; Vertes 1990). As ACh is also implicated in memory, this may well explain whey recent memories tend to become incorporated in dreams.

Therefore, during the production of REM and paradoxical sleep, there is increased cholinergic activity which increases and accelerates brain activity, whereas with the termination of REM, these same neurons greatly reduced their activity.



The PGO Wave Function

Dream sleep has its own unique wave function. Pontine geniculate occipital (PGO) waves are phasic field potentials which begin as electrical pulses radiating from the pons into the limbic system, the thalamus, and the neocortex (Frank, 2012; Hobson et al. 2000; Stickgold & Walker, 2010). These waves suddenly increase in amplitude and frequency just before the onset of REM. During waking two classes of neurotransmitters, serotonin and norepinephrine act to suppress PGO waves and activity whereas increases in cholinergic neurons and ACh increase PGO wave activity as occurs during dreaming (Hobson, et al., 1975; Lydic, et al., 1991).

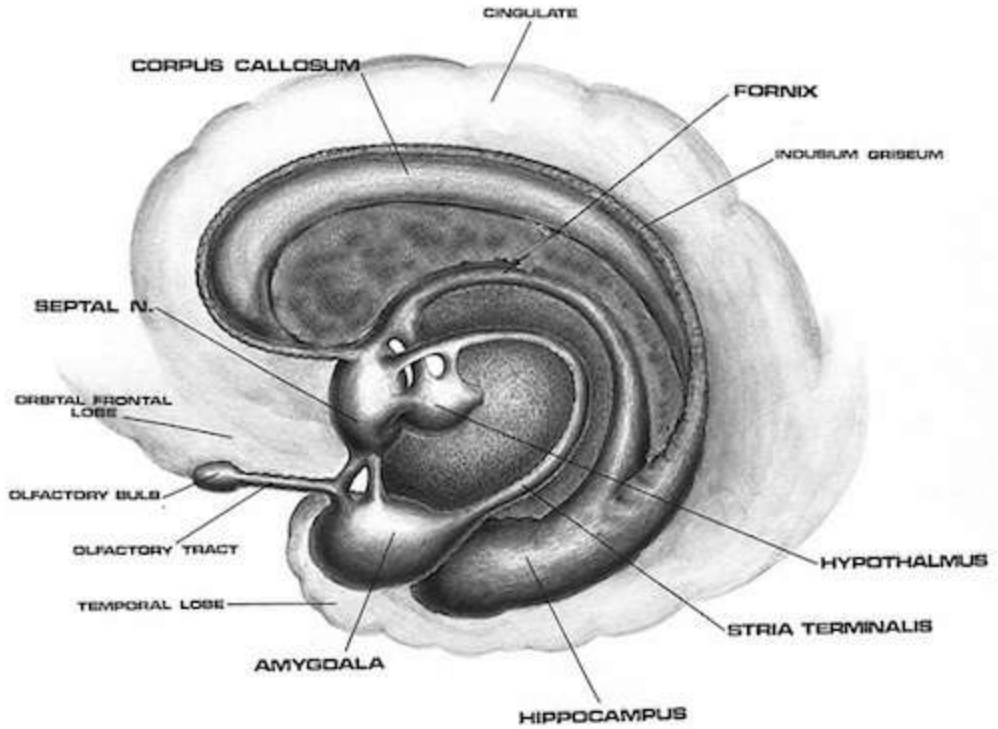
Characteristically, PGO waves and their propagation through the brain first appear during the last stages of synchronized sleep just prior to REM. That wave function increases in amplitude and frequency during desynchronized, paradoxical sleep and REM. Typically, PGO waves reach their maximum amplitude in the lateral geniculate nucleus of the thalamus which, like the amygdala, are also cholinergically responsive (Steriade & McCarley, 2005). In fact, activation of the amygdala can initiate and dramatically increase PGO wave activity (Calvo, et al. 1987). This is significant as the amygdala is a multi-modal brain area which is directly implicated in sensory filtering, dreaming, deja vu, and other paranormal experiences (Joseph 2000. 1911a,b).

Therefore, the conscious and sleeping brain has a wave function (Hobson 2004; Hobson et al. 2000; Penfiled & Hameroff 2011), and the wave function accelerates and increases during dream sleep (Hobson et al. 2000). As predicted by the Copenhagen interpretation of quantum mechanics, that wave function will interact with everything it encounters in the quantum continuum, and as such, and especially under accelerated conditions, it may become entangled with events still some distance away in space-time. As predicted by relativity (Einstein 1961), acceleration shrinks the distance between the present and the future.

Limbic System Accelerated Dream-Consciousness

Neurons within limbic system structures, such as the amygdala, receive input from multiple sensory modalities simultaneously, with streams of visual auditory tactile emotional gustatory olfactory and other forms of information impinging on single neurons. The amygdala along with other brain structures including the frontal lobe, normally acts to inhibit the perception of most of the stimuli impinging on the senses (Joseph 1992, 1996, 2000, 2012). This information is filtered so that a narrow reality becomes the focus of consciousness. This massive inhibition also serves to prevent the conscious mind from being overwhelmed with competing streams of input which are turned off. In other words, just as a channel selector on a television, radio, computer, or phone, permits the select reception of information from a single source (a single reality), these brain structures perform likewise. If inhibition is removed, such as when NE and 5HT levels are reduced, communication between select axons and dendrites in the amygdala is enhanced and these limbic system neurons becomes hyperactivated and the brain becomes

acutely sensitive to and may be overwhelmed by a kaleidoscope of overlapping sensations, e.g., tasting colors, seeing sound, smelling music. Some patients describe it as being given access to alternate worlds and realities of vast proportions or to hidden knowledge. Presumably this includes information which lies in the immediate future. Consciousness may also fragment and split apart, such that one aspect of consciousness may hover up above looking down, whereas that aspect of conscious still tied to the body may be down below looking up.



The amygdala is directly involved in dream sleep, REM sleep and PGO activity (Joseph 1996, 2012). Likewise, activity in the adjacent hippocampus accelerates and increases during REM, producing theta waves (Vertes, 1984, 2005). Hippocampal theta is associated with high levels of arousal. Because these same limbic system areas of the brain become disinhibited and experience accelerate activity during dream sleep, the dreaming brain becomes much more sensitive to fluctuations in the quantum space-time continuum which, as predicted by relativity, include the future; or rather, “a” future which, during sleep, is relative to the dreaming mind of the observer.

The amygdala, hippocampus, and the overlying temporal lobe are richly

interconnected and appear to act in concert in regard to paranormal and mystical experience (Broughton 1982; Gloor 1992; Hodoba 1986; Joseph, 1992a; Meyer et al. 1987). These structures are also implicated in memory (Joseph 2012). Presumably, during REM, the hippocampus and amygdala act as a reservoir from which various images, emotions, words, and ideas are drawn and incorporated into the matrix of dream activity observed by dream-consciousness (Joseph 1982, 1992, 1996). Often these structures incorporate memories and experiences from the previous day into the content of the dream. However, they are also sensitive to the quantum continuum even while sleeping, such that events which are perceived during dream sleep are often woven into the dream.

Therefore, these limbic system structure are directly linked to REM sleep, PGO wave activity, dream sleep, increased brain activity, deja vu, precognition, and a duality in consciousness such that the conscious mind can split off and observe itself and the body, as if the mind is on the ceiling looking down, in the audience watching a play, or passively observing a dream during dream-consciousness. However, because structures such as the amygdala are freed of inhibitory restraint during the course of dream-time, although the dreamer can't act on their dreams, they becomes sensitive to sources of information which are normally filtered out or which can only be accessed under an accelerated frame of reference; thereby providing the foundations for premonitions, deja vu, and precognition.

Dream-Consciousness and Entangled Minds

Dream-conscious and dream-time are linked to accelerated frames of reference, due to the arousal and hyperactivation of various brain structures including the amygdala, hippocampus and overlying temporal lobe; the activity of which is associated with REM, paradoxical EEG activity, and PGO waves. When these same structures are activated by electrodes, subjects have reported communing with spirits or receiving profound knowledge from the Hereafter. Some have reported a splitting of consciousness and of having left their body which they may observe from afar, as if they are on the ceiling or hovering above. Moreover, some subjects have reported that their disembodied consciousness could travel vast distances and observe family, friends, and strangers engaging in their daily activities:

“Far down below I could see houses and towns and green land and streams... I kept on going very fast...Then I was right over Pine Ridge. I looked down (and) saw my father’s and mother’s teepee. They went outside, and she was cooking... My mother looked up, and I felt sure she saw me... then I started back, going very fast...” (Neihardt 1988).

“I began moving at a tremendous speed... and I was aware of trees rushing below me. I just thought of home and knew I was going there... I saw my husband sitting in his favorite armchair reading the newspaper. I saw my children running up and down the stairs... I was drawn back to the hospital, but I don’t remember the trip; it seemed to happen instantaneously” (Eadie & Taylor 1992).

Likewise, it has long been believed by ancient cultures that while dreaming this disembodied dream-consciousness can wonder about and interact with other disembodied minds, including those who lived in the past or those who were bringing news of the future (Campbell 1988; Frazier 1950; Harris, 1993; Jung 1964; Malinowski 19490). It has also been believed that dreams may be shared, and that the dreamer can commune with the minds not just of the dead, but the living.

Anecdotal evidence in fact supports the possibility that dreams may become entangled, such that two individuals may experience similar dreams, or that during dreaming the mind of the dreamer becomes entangled with the waking minds of others. Consider, for example, studies performed in the Sleep Laboratory of Mimonides Medical Center in New York. This research group carried out several studies on entangled minds and dreaming and consistently obtained positive results (Krippner et al., 1971, 1972; Ullman, et al., 1977, 1989). In these studies, participants were introduced, and then later, while one subject slept and when it was determined he had entered REM sleep, the other would begin looking at particular paintings and prints. He would then attempt to project these images into the mind of the dreamer. Independent judges blind to the purpose and procedures of the experiment then judged if the dream reports contained any of the images sent by the sender.

In one experiment, when the test subject entered REM, the “sender” opened a package which contained an art print of the Mexican and Indian followers of the Mexican revolutionary Emiliano Zapta, i.e. Zapatistas, by Romero.

When the test subject entered REM, the "sender" began gazing at the picture and attempted to project it to the dreamer. The dreamer was immediately awakened when the REM episode had ceased and was asked to describe his dream. And this is what the dreamer dreamed: "...a feeling of memory... of New Mexico... a lot of mountains...Indians, Pueblos" (reviewed in Broughton, 1991; Ullman & Krippner, 1989).

Another "example of significant results, described by Krippner and colleagues (1989) occurred on a night when the randomly selected art print was "School of the Dance" by Degas, depicting a dance class of several young women. The "receiver's" dream reports included such phrases as "I was in a class made up of maybe half a dozen people; it felt like a school." "There was one little girl that was trying to dance with me."

Quantum Physics, Time Travel and Accelerated Dream Consciousness

Dreams are the royal road to often inaccessible realms of the mind and to realities that lie just beyond conscious awareness; realities which may exist only as probabilities and alternate worlds as predicted by the Many Worlds interpretation of quantum physics.

Dream-consciousness and dream-time are associated with accelerated levels of brain activity. Relativity predicts that observers with an accelerated frame of reference experience time-contraction and a shrinking of time-space such that the future and the present come closer together relative to those with a different frame of reference. However, space-time includes other observers and their conscious minds. Minds are also part of the quantum continuum; and this continuum extends into the future and the past, such that all are entangled.

Every particle, every object, person, planet, star, galaxy, the entire universe has a wave function. As based on a coupling of the Copenhagen with the Many Worlds interpretations, dream-consciousness can become entangled with the space-time continuum which includes the wave functions of other dreams and conscious minds.

Dream-consciousness, and dream-time, because they are maintained by certain brain structures which, during sleep, are freed of inhibitory restraint, also have a sensitivity to the quantum continuum which differs from and is more wide-reaching than the mind during waking. Much of the human brain is subject to inhibition, which prevents sensory overload and allows for the

focusing of attention. However, if that inhibition is removed from structures such as the amygdala, specific neurons and brain areas may greatly increase their activity and begin processing information which is normally filtered from the conscious mind; and this may include the future and the contents of other conscious minds. All of space-time, the quantum continuum, is entangled, everything is connected: stars, planets, dogs, cats, past, present, future, brains and minds. And all may interact through wave functions which intersect. Just as the ripples of a pond may strike distant shores, the space-time quantum continuum and wave function of minds, brains, the future and the past, may also effect distant shores and the eternal now of the event horizon of consciousness.

REFERENCES

Al-Khalili (2011). Black Holes, Wormholes and Time Machines, Taylor & Francis.

Almheiri, A. et al. (2013). Black Holes: Complementarity or Firewalls? J. High Energy Phys. 2, 062

Bethe, H. A., et al., (2003) Formation and Evolution of Black Holes in the Galaxy, World Scientific Publishing.

Bilaniuk, O.-M. P.; Sudarshan, E. C. G. (1969). "Particles beyond the Light Barrier". Physics Today 22 (5): 43–51.

Bo, L., Wen-Biao, L. (2010). Negative Temperature of Inner Horizon and Planck Absolute Entropy of a Kerr Newman Black Hole. Commun. Theor. Phys. 53, 83–86.

Bohr, N., (1913). "On the Constitution of Atoms and Molecules, Part I". Philosophical Magazine 26: 1–24.

Bohr, N., (1913). "On the Constitution of Atoms and Molecules, Part I". Philosophical Magazine 26: 1–24.

Bohr, N. (1934/1987), Atomic Theory and the Description of Nature, reprinted as The Philosophical Writings of Niels Bohr, Vol. I, Woodbridge: Ox Bow Press.

Bruno, N. R., (2001). Deformed boost transformations that saturate at the Planck scale. Physics Letters B, 522, 133-138.

Blandford, R.D. (1999). "Origin and evolution of massive black holes in galactic nuclei". Galaxy Dynamics, proceedings of a conference held at Rutgers University, 8–12 Aug 1998,ASP Conference Series vol. 182.

Carroll, S (2004). Spacetime and Geometry. Addison Wesley.

Casimir, H. B. G. (1948). “On the attraction between two perfectly conducting plates”. Proc. Kon. Nederland. Akad. Wetensch. B51: 793.

Chodos, A. (1985). “The Neutrino as a Tachyon”. Physics Letters B 150: 431.

Einstein, A. (1915a). Fundamental Ideas of the General Theory of Relativity and the Application of this Theory in Astronomy, Preussische Akademie der Wissenschaften, Sitzungsberichte, 1915 (part 1), 315.

Einstein, A. (1915b). On the General Theory of Relativity, Preussische Akademie der Wissenschaften, Sitzungsberichte, 1915 (part 2), 778–786.

Einstein A. (1939) A. Einstein, Ann. Math. 40, 922.

Einstein, A. (1961), Relativity: The Special and the General Theory, New York: Three Rivers Press.

Einstein, A. and Rosen, N. (1935). “The Particle Problem in the General Theory of Relativity”. Physical Review 48: 73.

Einstein, A., Lorentz, H.A., Minkowski, H., and Weyl, H. (1923). Arnold Sommerfeld. ed. The Principle of Relativity. Dover Publications: Mineola, NY. pp. 38–49.

Einstein A, Podolsky B, Rosen N (1935). “Can Quantum-Mechanical Description of Physical Reality Be Considered Complete?”. Phys. Rev. 47 (10): 777–780.

Eisberg, R., and Resnick. R. (1985). Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles. Wily,

Everett, A., & Roman, T. (2012). TIme Travel and Warp Drives, University Chicago Press.

Feinberg, G. (1967). “Possibility of Faster-Than-Light Particles”. Physical Review 159 (5): 1089–1105.

Fuller, Robert W. and Wheeler, John A. (1962). “Causality and Multiply-Connected Space-Time”. Physical Review 128: 919.

Garay, L. J. (1995). Quantum gravity and minimum length Int.J.Mod.Phys. A10 (1995) 145-166

Ghez, A. M.; Salim, S.; Hornstein, S. D.; Tanner, A.; Lu, J. R.; Morris, M.; Becklin, E. E.; Duchene, G. (2005). “Stellar Orbits around the Galactic Center Black Hole”. The Astrophysical Journal 620: 744.

Geiss, B., et al., (2010) The Effect of Stellar Collisions and Tidal Disruptions on Post-Main-Sequence Stars in the Galactic Nucleus. American

Astronomical Society, AAS Meeting #215, #413.15; Bulletin of the American Astronomical Society, Vol. 41, p.252.

Giddings, S. (1995). The Black Hole Information Paradox," Proc. PASCOS symposium/Johns Hopkins Workshop, Baltimore, MD, 22-25 March, 1995, arXiv:hep-th/9508151v1.

Hawking, S. W., (1988) Wormholes in spacetime. Phys. Rev. D 37, 904–910.

Hawking, S., (1990). A Brief History of Time: From the Big Bang to Black Holes. Bantam.

Hawking, S. (2005). "Information loss in black holes". Physical Review D 72: 084013.

Hawking, S. W. (2014). Information Preservation and Weather Forecasting for Black Holes.

Heisenberg, W. (1927), "Über den anschaulichen Inhalt der quantentheoretischen Kinematik und Mechanik", Zeitschrift für Physik 43 (3–4): 172–198.

Heisenberg. W. (1930), Physikalische Prinzipien der Quantentheorie (Leipzig: Hirzel). English translation The Physical Principles of Quantum Theory, University of Chicago Press.

Heisenberg, W. (1955). The Development of the Interpretation of the Quantum Theory, in W. Pauli (ed), Niels Bohr and the Development of Physics, 35, London: Pergamon pp. 12-29.

Heisenberg, W. (1958), Physics and Philosophy: The Revolution in Modern Science, London: Goerge Allen & Unwin.

Jaffe, R. (2005). "Casimir effect and the quantum vacuum". Physical Review D 72 (2): 021301.

Joseph, R (2010a) The Infinite Cosmos vs the Myth of the Big Bang: Red Shifts, Black Holes, and the Accelerating Universe. Journal of Cosmology, 6, 1548-1615.

Joseph, R. (2010b). The Infinite Universe: Black Holes, Dark Matter, Gravity, Acceleration, Life. Journal of Cosmology, 6, 854-874.

Joseph, R. (2014a) Paradoxes of Time Travel: The Uncertainty Principle, Wave Function, Probability, Entanglement, and Multiple Worlds, Cosmology, 18, 282-302.

Joseph, R. (2014a) The Time Machine of Consciousness, Cosmology, 18, In press.

Kerr, R P. (1963). “Gravitational Field of a Spinning Mass as an Example of Algebraically Special Metrics”. Physical Review Letters 11 (5): 237–238.

Lambrecht, A. (2002) The Casimir effect: a force from nothing, Physics World, September 2002

Lorentz, H. A. (1892), “The Relative Motion of the Earth and the Aether”, Zittingsverlag Akad. V. Wet. 1: 74–79

McClintock, J. E. (2004). Black hole. World Book Online Reference Center. World Book, Inc.

Melia, F. (2003). The Edge of Infinity. Supermassive Black Holes in the Universe. Cambridge U Press. ISBN 978-0-521-81405-8.

Melia, F. (2007). The Galactic Supermassive Black Hole. Princeton University Press. pp. 255–256.

Merloni, A., and Heinz, S., (2008) A synthesis model for AGN evolution: supermassive black holes growth and feedback modes Monthly Notices of the Royal Astronomical Society, 388, 1011 1030.

Minchin, R. et al. (2005). “A Dark Hydrogen Cloud in the Virgo Cluster”. The Astrophysical Journal 622: L21–L24.

Morris, M. S. and Thorne, K. S. (1988). “Wormholes in spacetime and their use for interstellar travel: A tool for teaching general relativity”. American Journal of Physics 56 (5): 395–412.

O’Neill, B. (2014) The Geometry of Kerr Black Holes, Dover

Penrose, R. (1969) Rivista del Nuovo Cimento.

Preskill, J. (1994). Black holes and information: A crisis in quantum physics”, Caltech Theory Seminar, 21 October. arXiv:hep-th/9209058v1.

Pollack, G. L., & Stump, D. R. (2001), Electromagnetism, Addison-Wesley.

Rindler, W. (2001). Relativity: Special, General and Cosmological. Oxford: Oxford University Press.

Rodriguez, A. W.; Capasso, F.; Johnson, Steven G. (2011). “The Casimir effect in microstructured geometries”. Nature Photonics 5 (4): 211–221.

Ruffini, R., and Wheeler, J. A. (1971). Introducing the black hole. Physics Today: 30–41.

Russell, D. M., and Fender, R. P. (2010). Powerful jets from accreting black holes: Evidence from the Optical and the infrared. In Black Holes and Galaxy Formation. Nova Science Publishers. Inc.

Schrödinger, E. (1926). “An Undulatory Theory of the Mechanics of Atoms

and Molecules". Physical Review 28 (6): 1049–1070. Bibcode:1926PhRv...28.1049S. doi:10.1103/PhysRev.28.1049.

Sen, A. (2002) Rolling tachyon," JHEP 0204, 048

Slater, J. C. & Frank, N. H. (2011) Electromagnetism, Dover.

Smolin, L. (2002). Three Roads to Quantum Gravity. Basic Books.

Taylor, E. F. & Wheeler, J. A. (2000) Exploring Black Holes, Addison Wesley.

Thorne, K. (1994) Black holes and time warps, W. W. Norton. NY.

Thorne, K. S. & Hawking, S. (1995). Black Holes and Time Warps: Einstein's Outrageous Legacy, W. W. Norton.

Thorne, K. et al. (1988). "Wormholes, Time Machines, and the Weak Energy Condition". Physical Review Letters 61 (13): 1446.

Wilf, M., et al. (2007) The Guidebook to Membrane Desalination Technology: Reverse Osmosis, Balaban Publishers.

*****

****

***

IV: THE BRAIN, MIND, SPIRITUALITY, RELIGIOUS AND THE GOD EXPERIENCE

*****

****

***

17. Altered States of Consciousness, And Neuroscience

Shaun Gallagher[1] and Juan C. González[2]
[1]Philosophy, University of Memphis (USA),
[1]School of Humanities, University of Hertfordshire (UK),
[1]Faculty of Law, Humanities and the Arts, University of Wollongong (AU),
[2]Philosophy and Cognitive Science, Universidad Autónoma del Estado de Morelos, Cuernavaca (MX)

Abstract

Philosophers like Kant and the phenomenologists argue that time is a fundamental determinant of human cognition and that any dysfunction in this determinant will lead to a loss of meaningful experience. The phenomenology and science of psychotic delusions and drug-induced experience supports this idea. At the same time some philosophers and scientists have argued that such radical changes in temporal experience can be revelatory of different ways of thinking about reality and of different meaning structures. In this paper we review the relevant philosophical arguments and scientific evidence for these positions, and examine three issues. The first is whether science is empirically investigating its own rationalist foundations when it studies altered states of consciousness. The second concerns whether experiences of delusions and hallucinations challenge our default conceptions of reality. And third, can altered states of consciousness provide a form of knowledge or put us in a position to acquire knowledge? We argue that whether changes in temporal experience reveal different and productive provinces of meaning or not, they do reveal the limits of our normally ordered meaning, the limits of science and of what we consider a rational world.

Keywords: Delusion, hallucination, phenomenology, neuroscience, reality

1. Temporal Order and Time Perception

Philosophers and scientists have argued and produced good evidence to show that temporality, a broad term meant to include experiential aspects of temporal order and time perception, is basic to a coherent experience of

meaning. That is, absent a well-ordered temporal structure, experience would be chaotic and meaningless, or, at best, radically different from what it is when well-ordered temporal processes are operating properly, in line with the naturally evolved way that our human neurobiological systems work. This has been made clear in philosophers such as Kant, the phenomenologists, and in the majority of neuroscientific studies of changes in temporal experience in, e.g., schizophrenic psychosis and drug-induced states.

In contrast to this, some philosophers and scientists have argued that such modulations in temporal experience, under practices of drug-induced changes, can be revelatory of different ways of thinking about reality and of different meaning structures. That is, such experiences are not disorganized but reorganized in such a way as to produce alternative meaning and knowledge.

In this paper we examine the contrast of these two general perspectives and argue that whether changes in temporal experience reveal different and productive provinces of meaning or not, they do reveal the limits of our normally ordered meaning, the limits of science and of what we consider a rational world.

2. Philosophy: Kant and the Phenomenologists

As is well known, Kant (1965), in his Critique of Pure Reason, developed a transcendental approach, that is, an approach that purported to demonstrate the conditions of possibility for any rational experience. Basic to his project is the idea that our consciousness is ordered by two basic forms of intuition: time and space. We can think of his term ‘intuition’ as signifying any presentational mode of experience: perception, memory, imagination, etc. The form or structuring performance of any perception, for example, is governed by temporality and spatiality. Anything that we perceive falls into a spatial-temporal order precisely because the mind structures it that way a priori, that is, independently of what we experience. For Kant, time is more basic than space because time, but not space, applies to the mind itself. Our consciousness itself is set out in a temporal order, but, as Descartes maintained, it is not extended in space. Contemporary debates in cognitive science about embodied and distributed cognition may challenge this (see Gallagher, 2005), but we leave that aside for our purposes.

In his transcendental deduction Kant then demonstrated that there are a set

of categories or pure concepts of the understanding that apply to objects of intuition in general. His table of categories comprises 12 concepts that are grouped in 4 sets: the categories of quantity: Unity, Plurality, and Totality; the categories of quality: Reality, Negation, and Limitation; the categories of relation: Inherence and Subsistence, Causality and Dependence, and Community; and the categories of modality: Possibility-Impossibility, Existence-Non-existence, Necessity-Contingency. In a nutshell, these categories presumably frame our experience of the world a priori, in such a way that when we come into cognitive contact with the world, what we perceive is not only structured spatiotemporally (given the transcendental forms of intuition), but also with a default 'format' that makes our experience of the world intelligible. Indeed, these categories allow the mind to process the objects of experience in a structured or orderly fashion and eventually make sense of them.

The idea that time is so basic to experience suggests that any disorder affecting the temporal organization of experience would also affect the categories that structure what we perceive. This is easiest to see with respect to the categories of unity and causality. Unity or identity can be thought of as inextricably linked to temporality: a unit is a persistent, sustained and/or self-contained entity persisting over time. If temporal persistence or duration were broken, then our experience would be of things lacking unity. Causality involves at a minimum an ordering of one event (the cause) happening prior to another (the effect). Alter the temporal sequencing function of experience in a way that would disallow the perception of sequence, then the category of causality would fail to work. More generally, disorders in temporal experience would result in a breakdown of the rational appearance of reality.

Phenomenologists, like Husserl (1991), Heidegger (1968) and Merleau-Ponty (1962), also place great emphasis on the importance of temporality for an ordered experience. Husserl's analysis of time-consciousness is perhaps the most influential of these accounts. According to Husserl, who was influenced by William James' (1890) empiricist idea of the stream of consciousness, each moment of one's experience is present for only an instant, and then slips away into the past, even if the object of consciousness remains present and unchanging. It is also the case that some objects of perception, for example, melodies, are constantly changing. In that case we have the successive flow of consciousness and the succession of the temporal

object. Yet, in some way the flowing retreat of consciousness is able to maintain an orderly sense of the melody as it expires in time. The attempt to explain how this is possible is at the root of Husserl's account.

According to his analysis, consciousness always includes a narrowly directed intentional grasp (the primary impression) of the present moment of whatever is being experienced, for example, the current note in a melody, or the current phase of any enduring object. But the primary impression never happens in isolation; consciousness includes two other structural aspects: the retentional aspect, which provides us with a consciousness of the just-elapsed phase of the enduring object, thereby providing past-directed temporal context; and the protentional aspect, which in a more-or-less indefinite way anticipates something which is about to be experienced, thereby providing a future-oriented temporal context.

Figure 1 summarizes Husserl's model. The horizontal line ABC represents a temporal object such as a melody of several notes. The vertical lines represent abstract momentary phases of an enduring act of consciousness.

Each phase has a threefold structure consisting of:

- primal impression (pi), which allows for the consciousness of an object (a musical note, for example) simultaneous with the current phase of consciousness;
- retention (r), which retains previous phases of consciousness and their intentional content;
- protention (p), which anticipates experience which is just about to happen.

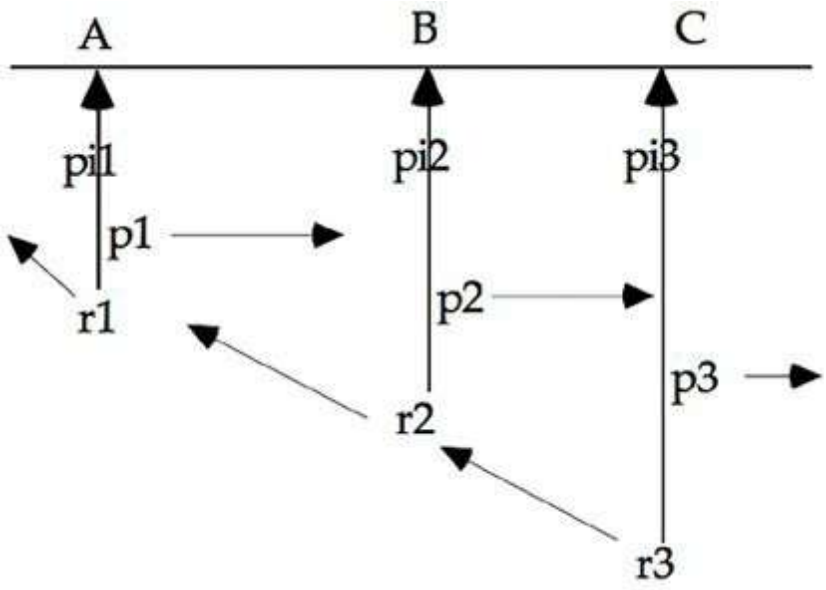


Figure 1: Husserl's model of time-consciousness (from Gallagher 1998; 2012)

Although the specific experiential contents of this structure from moment to moment progressively change, at any given moment this threefold retention-primal-impression-protention structure is present (synchronically) as a unified whole.

If, for example, we are listening to music, the retentional aspect of consciousness keeps the intentional sense of the previous notes or measures available even after they are no longer audible. On Husserl's account, consciousness retains the sense of what has just been experienced, not by retaining the event itself, but by its tacit awareness of the just-past phase of consciousness. Furthermore, as I listen I have some anticipatory sense of where the melody is going, or at the very least, that the melody is heading toward some indeterminate conclusion. The protentional aspect of the act of consciousness also allows for the experience of surprise or disappointment. If the melody is cut off prematurely, I experience a sense of incompleteness,

precisely because consciousness involves an anticipation of what the imminent course of experience will provide, even if this remains relatively indeterminate.

The primal impression-retention-protention structure is the temporal organizing principle of consciousness that allows us to experience the world in a meaningful way, where the past, which is no longer there, is kept in mind, and the future, which is not yet there, is anticipated. In viewing a horse race, for example, our perception is not restricted to a current but durationless snapshot of the horses' movements – if it were, we would sense no movement at all. Perceptually, it is not as if the horses suddenly appear out of nowhere in each new moment. Rather than perceiving their present position and then adding to that the recollection of where they were a moment ago, we actually perceive the horses moving on the track as they are racing. That is, we do not engage in an act of comparative remembering in order to establish the temporal context of their current position. And yet all the previous parts of the race do not remain perceptually present in the same way as the horses' current positions. If that were the case, they would perceptually fill the entire space they had just traversed. The past movements do not remain visually present in some vague ghostly manner. Retention does not keep a set of fading images in consciousness. Rather, because of the way that our consciousness is structured, at any moment what we perceive is embedded in a temporal horizon. What we see is part of or a continuation of, or a contrasting change from what went before, and what went before is still intentionally retained so that the current moment is experienced as part of the whole movement. Consciousness retains the just past, not with the significance of something present, but with the meaning or significance of having just happened.

Other aspects of Husserl's analysis are important for solving problems that relate to the unity of consciousness, personal identity and action. For our purposes, however, it is sufficient to emphasize that in the absence of this kind of temporal structure, experience would tend to be chaotic. We live in a coherent and meaningful world precisely because we are able to navigate through a stream of experience without getting lost – and our other abilities, like our ability to move through space, or to find our way into relationships in the social world, fully depend on our temporal navigations (Gallagher and Zahavi, 2012).

3. Neuroscience, Pharmacology and Phenomenology

One can get a glimpse of what would happen if the temporal structures of experience were disrupted, by considering a case of motion agnosia. Neuronal structures in the medial temporal cortex are specialized for visual detection of motion. If this part of the cortex, and possibly other areas, including posterior temporal cortex abutting the occipital lobe, are damaged, by stroke for example, visual perception of form and color may be preserved, but perception of motion is disrupted. A person who suffers from motion agnosia experiences the world as seemingly without motion, frozen in place, for several seconds. Things then suddenly rearrange themselves in new positions. Imagine crossing a busy street where you see cars and know they are moving, perhaps by auditory clues, but simply can't see their movement (see Schenk and Zihl, 1997; Zihl et al. 1983).

Such a disruption plays havoc with the person's abilities to make sense out of the world and to act in it. Temporal continuity seems absolutely essential for making sense out of our everyday experience. This is not to deny that there is discontinuity too. We can shift rapidly from one activity to another, we can move from one situation into a completely different one, and we can even experience disruptions and breakdowns where the flow of information or activity becomes quite confused. Ultimately, if we are to restore sense to these experiences, we have to take them up into a more cohesive temporal framework.

Despite difficulties with the perception of motion, a person with motion agnosia can still function because the greater part of her non-visual experience retains some anchor in a cohesive temporal structure. Consider, however, an even more profound disruption of temporal experience. What if our ongoing experience lacked temporal coherence entirely? What if, for example, I was unable to keep the just previous moment of experience in mind long enough to write it down, or was unable to anticipate events in the next second? Would my experience make any sense at all? Husserl is motivated to ask about this possibility and admits that the temporalizing function of consciousness could fail to hold:

> Could it not be that, from one temporal moment on, all harmonious fulfillment would cease and the series of appearances would run into one another in such a way that no posited unity could ultimately be

> maintained…Could it not happen that… the entire stream of appearance dissolves into a mere tumult of meaningless sensations. Thus we arrive at the possibility of a phenomenological maelstrom … it would be a maelstrom so meaningless that there would be no I and no thou, as well as no physical world—in short, no reality (1998, pp. 249-250).

We may approach an understanding of such radical breakdowns in temporal and semantic organization by looking at certain psychopathologies and drug-induced experiences. For a very long time we've known that schizophrenia and other psychological disorders can involve changes in temporal experience and time perception. In schizophrenia, for example, difficulties in temporally indexing events, distortions in time estimation and temporal velocity, the curtailment of coherent future time perspective, and a confusion between past, present, and future are frequent occurrences (Braus, 2002; Davalos et al. 2002; 2003; Elvevag et al. 2003; Tenckhoff et al. 2002; Volz et al. 2001).

It is also well known that chemical changes in the brain caused by the ingestion of drugs can alter the experience of time. Cannabis intoxication, for example, results in increased heart rate and abnormal EEG rhythms, disturbances in perceptual experience, and distortions in time estimation and time perspective, including flashbacks (Bech, Rafaelsen & Rafaelsen, 1973; Jones, 1978; Lieving 2006; Matthew et al. 1998; Tinklenberg et al. 1972). Opiates may produce an experiential expansion of time (Friedman, 1990; Mansky, 1978) or alteration in timing, which is a pervasive factor in motor control, perception, language production, and so forth (Meck 1996).

Psychoactive or psychedelic drugs, such as LSD, mescaline, and psilocybin, produce physiological changes with phenomenological effects and hallucinations in which time seems to either speed up or slow down. Given the complexity and inadequacy of many empirical and conceptual analyses of hallucinations (Dokic & Martin, 2012; González, 2010a,b; González & Dokic, 2009; Lehmann & González, 2009), we offer the following working definition. By 'hallucination' we understand a conscious mental state whose phenomenal and semantic content is imposed on the agent's psyche by endogenous causes, with clear and simultaneous impact on routine patterns of perception, belief and behavior of the agent. Hallucinations are hence deviant (i.e., statistically-abnormal and novel) cognitive phenomena. Subjects may also suffer from disordered temporal experience, abnormalities in time

estimation and temporal orientation (Barr et al. 1972; Heimann, 1994; Hollister, 1978; Ornstein, 1969). Objective measures of these disturbances in subjective time sense suggest deficits in working memory and subjective changes in conscious states that include depersonalization and derealization (Wittmann et al. 2007).

The phenomenology of intoxication with mind-altering substances and, more specifically, with the so-called hallucinogens (mescaline, DMT, psilocybin, salvinorin A, LSD, bufotenin, etc.) — whether in traditional indigenous rituals or in isolated individuals — is truly fascinating and, as just indicated, involves changes in the experience of time and perceptual reality. Indeed, these substances:

> produce deep changes in the sphere of experience, in perception of reality, in space and time, and in consciousness of self. Depersonalization may occur. Without loss of consciousness, the subject enters a dream world that often appears more real than the normal world…. The psychic changes and unusual states of consciousness induced by hallucinogens are so far removed from similarity with ordinary life that it is scarcely possible to describe them in the language of daily living. A person under the effects of a hallucinogen forsakes his familiar world and operates under other standards, in strange dimensions and in a different time. (Schultes, Hofmann & Rätsch, 2001, p. 14).

Thus, under the influence of hallucinogens, our temporal consciousness may be profoundly modified, without necessarily losing our lucidity or cognitive contact with the world. Thus María Sabina (1888-1985), a well-known Mazatec healer and shaman, indicated that "[t]he more you go inside the world of Teonanácatl [the psilocybin mushrooms], the more things are seen. And you also see our past and our future, which are there together as a single thing already achieved, already happened" (Cited in Schultes, Hofmann & Rätsch, 2001, p. 1).

Although the "pharmacological basis of the experience of time and temporal processing is only vaguely understood" (Wittmann et al. 2007, p. 61), neuroscientific research into the pharmacological mechanism of hallucinogens and dissociative anesthetics (such as ketamine) that cause time disturbances shows an imbalance among serotonin, glutamate and dopamine neurotransmitter systems critical to psychotic symptom formation (Vollenweider, 1998). Specifically, changes in time perception and motor

timing have been linked to the dopamine system (Meck, 1996; O'Boyle et al. 1996; Rammsayer, 1999; Reuter et al. 2005), and to fronto-striatal circuits purportedly involved in timing and the coordination of temporal sequence (Meck and Benson 2002). Pharmacological manipulations of the serotonin system also affect duration discrimination abilities in humans (Rammsayer, 1989), and impairments in related frontal cortical regions, closely linked with working-memory function (or in phenomenological terms, with the temporal structure of retention-primal impression-protention) correlate significantly with altered time sense and depersonalization (Wittmann et al. 2007).

Altered time sense, in either schizophrenic psychosis or drug experiences, is not an isolated effect. Much more comes along with it, including such experiences as depersonalization and derealization which can involve dramatic changes to self and to our sense of reality. In some cases such changes, experienced, for example, as an "oceanic boundlessness," can be associated with positive mood including experiences of the sublime or heightened feelings of happiness; in other cases they can be accompanied by anxiety and paranoia, thought disorder, a disintegration of self, loss of autonomy, and feelings of being endangered, including changes in or loss of identity, lack of differentiation between ego and non-ego with respect to thought process, affective states, and body experiences, as well as deficits in self-determination in acting, thinking, feeling, and perceiving. Likewise these experiences can be accompanied by auditory and visual illusions, hallucinations, synaesthesia, and changes in perceptual meaning. These are common features of both drug and non-drug induced altered states of consciousness (see Dittrich, 1998; Vollenweider & Geyer, 2001). Thus, for example, "administration of either a serotonergic hallucinogen (e.g., psilocybin) or an NMDA [N-methyl-D-aspartate] antagonist (e.g., ketamine) elicited a psychosis-like syndrome in normal volunteers that was characterized by ego disturbances, illusions and hallucinations, thought disorders, paranoid ideations, and changes in mood and affect" (Vollenweider & Geyer, 2001, p. 497). In other words, the coherent structures of experience and reality themselves can be at stake and can be shaken right down to their most basic temporal order. It should be noted, however, that many —if not all— of these subjective effects (whether positive or negative) are the result of a complex interaction between the drug or the material cause and what is known as the "set and setting" of the altered state (i.e., the internal and

external conditions in which the experience takes place). The pharmacological agent or material cause by itself is insufficient to explain, understand or predict the specific alteration of experience. Notwithstanding this, these episodes are usually accompanied by a disruption of our normal sense of reality and time experience, for better or for worse.

4. Knowledge and Reality

There are a number of philosophical questions raised by this juxtaposition of philosophical and scientific discussions of delusions and hallucinations in respect to temporality. Here we'll identify three interconnected issues and try to show how they challenge our received conceptions of knowledge and reality. The first concerns science; the second involves the concept of reality, and the third involves knowledge of a different sort.

Both Kant and Husserl were concerned about the foundations of science. That is, their attempts to work out a transcendental deduction of categories and to do a precise phenomenology, respectively, were motivated by a desire to provide epistemological and phenomenological guarantees that science can deliver (true and reliable) knowledge. Thus Kant's transcendental deduction was an attempt to provide science with the rational categories it needed to do its work – categories such as causality, unity, etc., and to give them epistemological rigor in the wake of a Humean analysis that would have made science just one more imaginative story. Husserl wanted to make firm our conception of consciousness since it is only by way of consciousness that we can do science. We need to have a clear understanding (phenomenology) of consciousness to make sure we know its limitations and the possible distortions it may introduce into the scientific enterprise.

Their analyses suggest that if the categories are not working properly, or if consciousness is not functioning properly, then it is really impossible to do science. And at the very base of our mental enterprises time or the temporal structure of consciousness has to be intact for the rest to function properly. Accordingly, only when temporality holds fast can one conduct science, including the neuroscience that examines the underlying mechanisms that explain what goes wrong when, in cases of psychotic delusion or drug-induced states, the temporal structure of experience, and with it, all other aspects of rational reality get seriously modified. No less than the Kantian analysis, the scientific study of abnormal mental phenomena is a study of

rationality, or the limits of rationality – an empirical study, however, rather than a transcendental study. Indeed, science tends to pay no attention to Kant or to a worry about its own foundations. And yet it seems to be digging into its foundations when it investigates delusion and hallucination. To see why this is philosophically dicey, let's look at the second question.

It is commonplace to suggest that people who experience various delusions or hallucinations, in cases of psychotic disorders or drug-induced experience, enter into a different world or an alternative reality. Whether this is taken in a metaphorical or literal sense, the fact is that people who are in these abnormal states usually behave "as if" they were dealing with an alternative reality or world, sometimes radically different from the commonsensical one. Moreover, when telling about their experience, these people usually cast their descriptions with lucidity in perceptual and other cognitive terms. This seems to entitle one to speak of alternative, "non-ordinary realities" that one can enter or enact through certain altered states of consciousness (Duits, 1994; Grof, 2006; Huxley, 1990; Michaux, 1972). It's difficult for science to comprehend how this would be possible, since science is heavily invested in explaining the one objective world defined by physics and the established laws of nature – the default world that is also accepted without question by common sense. Philosophers sometime talk about parallel universes or possible worlds when they do metaphysics, but this seems more of a logical exercise than anything that would lead us to believe that there are such universes. Moreover, a science of delusions and hallucinations is always a science based on the categories of non-delusional, non-hallucinated, default, objective reality, whether defined by Kant, or by physics and the established laws of nature.

William James (1890, II, pp. 291-306), however, suggested that in some sense we all live in a plurality of sub-universes, an idea developed further by the phenomenologist Alfred Schutz (1974) under the heading of 'multiple realities'. According to this idea, the experiencing subject does not live in the one unified world of meaning defined objectively by science or common sense, but in multiple realities or "finite provinces of meaning." As both James and Schutz suggest, there is a "paramount" or default reality – the reality of shared everyday life that we normally engage in, established in orderly time. This is the world where we work, earn our salary, socialize, enjoy family life, engage in scientific pursuits, and so forth.

Phenomenologists call it the 'lifeworld'. But there are also multiple other realities that take us away from everyday reality. If, for example, I read a novel, or go to the theater or the cinema, or play a video game, I spend a couple of hours (measured on the clocks of paramount reality) escaping into a different sort of reality, a different time (possibly an imagined past or future) or a different place which opens up in the pages, on the stage, or on the screen.

The various "realities" (and the diverse sets of rules that govern them) are not necessarily commensurable – they have their own rationalities. Indeed, my actions or virtual actions are likely different in these different realities. Such changes in my behavior can be existential, involving a transformation of background familiarity and of the sense of reality. Usually, however, I can make sense of my behavior in these alternative realities and can understand what I'm doing from the perspective of everyday reality. There are normally clear transitions as I move from one to another. In everyday reality I can go to the theater; once in the theater I enter a different reality. At some level, when I enter into a virtual world, such as a video game, I keep account of the fact that from the perspective of everyday reality, I am playing a game. I can distance myself from the various roles that I might play or fantasize about. If I am truly engaged or fully immersed in one of these alternative realities, however, it is not simply that I adopt an alternative set of tractable beliefs or values. Rather, I may enter into it, so to speak, body and soul, or to some varying lesser degree. Indeed, the alternative reality has a certain "presence" and salience that makes it more than an intellectual exercise. I am in-the-world of the play, the film, the game, etc.; I can get excited and emotional, or remain cool under pressure; I may adopt a certain physical posture, I may act virtually, and I may engage in such action explicitly or implicitly. Sometimes, as I come back out of such realities, everyday reality can seem oddly unreal in relation to what I have been doing.

Both James and Schutz suggest that we can apply this idea to experiences of delusion and hallucination (Gallagher, 2010). It seems quite possible that one can enter into a delusional or hallucinatory reality just as one can enter into a dream reality, or a fictional reality, or a virtual reality. Like other alternative realities, some delusional realities are ones that are more or less cut off from one's everyday reality; ones that are incommensurable with the normal rules of reason that govern one's everyday default lifeworld, but ones

that may have their own rules, and ones that offer a different set of affordances for action. As Louis Sass (1992, p. 109) puts it, the delusional subject "inhabits a world radically alien to that of common sense." For the schizophrenic, "the world can no longer be taken for granted" (Merleau-Ponty, 1962, p. 335).

The neuropsychatrist J. Allan Hobson (2005) has defended the idea we can identify (psychedelic) hallucinations with dream-like states that have as little or as much reality as a dream does. Some researchers claim that in certain hallucinatory states, the feeling they get from their hallucinations is not only that they are real, but that they are "more real than real." For example, Benny Shanon has stated that:

> With Ayahuasca, people often feel that what they see is 'more real than real'. From a theoretical point of view this is especially significant. Often in the philosophical and psychological literature, non-ordinary notions of reality are associated with a diminishing sense of reality. Thus, many have argued that what distinguishes true perception, on the one hand, and memories, imagination, and dreams, on the other, is that the former is clearer, more distinct, and more coherent than the latter...[think of Locke and Hume]. In contrast, the Ayahuasca experience presents cases of an enhanced sense of reality. This indicates that the reality judgment is actually a parameter that can take different values. Dreams and imagination usually decrease the value assigned to this parameter; the Ayahuasca experience may increase it. (Shanon, 2002, p. 265)

Our awareness can be immersed in a very realistic atmosphere during the Ayahuasca experience, to the point of taking the hallucinated objects for real, without doubts or skeptical attitudes.

> Normal human beings do not doubt that what they perceive is real ... the act ... of perception forces itself upon us and the moment we open our sensory faculties we are immersed in the world of our perception without any choice or room for doubt, like fish in water.... Experientially, what is felt with powerful Ayahuasca visions is very similar" (Ibid.)

Shanon notes, however:

> Real though the Ayahuasca visions may be deemed to be, they are not usually confused with the normal perceptions of the ordinary world. Rather, the feeling is that what is seen in the visions pertains to other, separate realms. Hence, in general, at least a degree of an awareness of the

real world is maintained" (Ibid.)

5. Restructured Reality

To think of delusions or hallucinations in terms of multiple realities is not to rule out a different way of putting it (one that we prefer), namely, that delusions and hallucinations involve a radical or structural (or existential) change in the way that the subject relates to everyday reality. John Kafka (1989), for example, although using the term 'multiple realities' in the context of clinical psychoanalysis, conceives of them as different organizations of everyday reality, or what he calls different 'reality organizations'. On this view there is one reality, independent of our cognitive states. When we engage or interact with reality, however, we cannot separate our cognitive frame of reference (specific to our species, ecological niche, ontogenetic development and even perhaps our current situation) from it. The realist idea is that there is one reality, which is cognitively accessed from different perspectives, although no single agent, experience, or system of beliefs can pretend to exhaust all possible descriptions of reality. What hallucinations and altered states of consciousness reveal are novel ways to experience and interact with reality – novel reality organizations. On a neo-Kantian perspective, the novelty arises through the modification of the internal relations that hold between the categories of understanding and our cognitive matrix (González, in press).

In Capgras Delusion, for example, the patient typically takes a familiar person, for example, a spouse, to be an imposter. Although rare, a subject may consider some physical objects, such as a set of tools to have been replaced by exact doubles (Ellis, 1996). One might say that the tools remain part of default reality, but that the patient's relation to the tools has been radically reconfigured (see, e.g., Dreyfus, 1987; also Kafka, 1989). This may in some cases be a more apt description than saying that the person has entered into a delusional reality where her tools have been replaced by replicas. The difference in the way of putting this, however, may reflect how comprehensive or pervasive, or "firmly sustained" (DSM IV) the delusion is. For example, the subject may still use the tools as tools rather than treating the tools as instruments with magical powers. In extreme cases, however, the delusion rather than the default reality organization becomes paramount.

As we've seen, such alterations in conscious states frequently involve

different experiences of time. On one reading, this could simply be a feature of the alternative reality organization – the structural change in reality comes with some kind of change in the way that time behaves. Some philosophers and psychiatrists, however, especially those in the Kantian and phenomenological traditions (e.g., Minkowski, 1970), have suggested that the change in time experience is more basic than that, and specifically that it is the "generative disorder," which means that the change in temporality drives other aspects of the experiences.

Again, we can put this in Kantian terms and think of our everyday, default conceptual structure in terms of a grid or format that is superposed on the world, through which we cognize, represent and evaluate it. In this perspective, we may think of alternative states as different "epistemic positions" that allow for alternative forms of cognitive understanding involving modifications to the categorial grid. It could then be the case that during a delusional or hallucinatory experience the habitual relation between the world, our consciousness and the overarching conceptual structure is modified in a way that the internal-external, self/non-self relations are altered. And this could be the result of shifting categories or transformations in time-consciousness.

Indeed, it could be the case that during a hallucinatory episode the categories of quality — the category of reality in particular— are preserved or even enhanced in a way that the contents of awareness are vividly felt as real, while other categories may radically change, affecting the experience and drastically modifying it, resulting in a delusional or hallucinatory otherworldly or bizarre character. Within this system, the status of reality goes hand-in-hand with the exercise of the conceptual-categorial structure so that what we experience in delusions or hallucinations is neither more nor less real than what we experience in our everyday, paramount reality – just different. Delusions and hallucinations would therefore involve a consciousness that is either structured by an anomalous categorial grid or one that, in itself, no longer matches, partially or totally, the regular connections within the default or everyday categorial grid. To each possible disjunctive reality organization there would correspond different "epistemic positions" that allow us to do justice, in positive terms, to different types of genuine experience.

6. Science and Alternative Forms of Knowledge

It's at this point that our initial question about science links up with this idea of alternative epistemic positions or sets of modulated categories. To put the issue in its most radical form, the question is why should we think that science (or rationality) must be strictly tied to the default or everyday reality organization? Would it be possible to think that there are multiple sciences – different forms of knowledge that are relative to the different forms of reality that map onto alternative rationalities revealed by delusional or hallucinatory (or indeed, some other kinds of) experiences. The situation is analogous to thinking about geometry at the time of Kant; the idea that there could be non-Euclidian geometries was not even on the horizon. Kant wrote: "The apodeictic certainty of all geometrical propositions and the possibility of their a priori construction is grounded in this a priori necessity of space…. Geometry is a science which determines the properties of space synthetically, and yet a priori," (1965, pp. B/39-40), where geometry means Euclidian geometry. Likewise, Kant thought that time, as a form of intuition, was a priori and universal. But if delusions and hallucinations suggest that there are non-Kantian forms of time (analogous to non-Euclidian forms of space), we might think that there could be a science, or multiple sciences, dedicated to the alternative reality organizations that open up around these alternative temporal axes. Such alternative organizations are un-hinged only in relation to Kantian time.

This motivates our third question. Might it be possible to gain a different form of knowledge from these alternative states of consciousness? It is quite easy to give an affirmative answer when we think of the alternative "realities" of the novel, the film, the theatrical play, the dream, etc. But what about delusions and hallucinations? One of us (SG) was once tracked down by a former student who was keen to convince his former professor that he had a new explanation of the universe. It was clear from his demeanor that he was suffering from a schizophrenic delusion, and I listened to his explanation with complete concern for his well being, but also with complete skepticism about his new explanation. From the perspective of my default epistemic position, and from the perspective of science, his explanation made no sense, and I was completely (and many would say justifiably) skeptical. It's not definite, however, that there was no value in his thinking.

Whether the hallucinatory experience provides (or can provide) knowledge

or, at least, whether it puts (or can put) us in the position to acquire knowledge, we remain agnostic, torn between skeptical arguments of scientific and epistemological character (e.g., the orthodox definition of knowledge) and anthropological accounts, and (in the case of one author, JG) personal experiences supporting the claim that, at least in a pragmatic sense, hallucinations can dispense knowledge. The problem for establishing a definitive answer to this question (and, therefore, for escaping agnosticism on this point) may reside in the conception of knowledge at stake – what we understand by 'knowledge'. There are certainly several types of knowledge, and a proper answer to the above question may crucially hinge on the type of knowledge we have in mind and on the method of justification that we consider adequate for validating it.

A further question, however, is whether a kind of knowledge derived from hallucinations or delusions – a kind of knowledge tied to a non-Kantian temporal framework or to a consciousness with an anomalous temporal structure – would have any relevance to (or be able to explain) our default, everyday experience, or whether it would apply narrowly only to the hallucinatory or delusional experience. If, as we suspect, it may be the latter, then why should we not turn this question around and ask why we should expect that science, as we know and practice it – call it default science (which, at least on Kantian and phenomenological grounds, is tied to our default everyday rationality) – would have any relevance to (or be able to explain, or explain away) those alternative states of consciousness?

Of course, as one of the reviewers suggested, someone might say that science, operating in the default everyday mode, is able to give an account of the delusional or the hallucinatory state, whereas from within the latter states it may not be possible to account for everyday default rationality. This epistemic asymmetry is similar to waking state in contrast to dream state: it is from the standpoint of the waking or lucid state that we know about and can theorize about the dream state, whereas, within the dream state we do not know about the waking state. One might claim that this asymmetry offers an epistemic privilege to sober, rational wakefulness and thus to science and philosophy. On the one hand, this claim for epistemic superiority of waking/lucid states over the delusional/hallucinatory ones, however, appeals to rational/scientific standards, and in this sense may beg the question. On the other hand, we agree that we can best discriminate delusional and

hallucinatory states only in comparison to default everyday baseline states that are reliable and have epistemic value. In commenting on Donald Davidson's stance towards classical skepticism, Richard Rorty (2003) makes a similar claim:

> Davidson's point is that retail skepticism makes sense, but wholesale skepticism does not. We have to know a great deal about what is real before we can call something an illusion, just as we have to have a great many true beliefs before we can have any false ones. The proper reply to the suggestion that [something] might be illusory is this: Illusory by comparison to what? (Rorty 2003)

Finally, however, with respect to the question of epistemic value, it's important to note that hallucinations, as we have defined them, in contrast to delusional states, are cognitive states that allow us to experience reality in an uncommon, alternative fashion, attending to aspects of it not usually processed by our default cognitive powers. In this case, then, a different epistemological picture emerges (González, 2010a). An alternative knowledge is possible either because our default epistemic categories are modified, or because our normal justification procedures are changed, and this itself could have an impact on our habitual everyday practices or behavioral patterns, and perhaps a practical effect on our lives, our relations to others and to the world. The history of mystical experience, the existence of shamanic cultures, and perhaps even poetry and art, testify to this kind of knowledge, a knowledge that is only partially commensurable with scientific rationality. Here we can picture two sets of Kantian categories, partially shifted in respect to each other, in temporal, spatial and qualitative features, constituting complementary points of view or different ways to experience reality, and yet both with real consequences on our everyday practices.

Acknowledgments SG's research is supported by the Humboldt Foundation's Anneliese Maier Research Fellowship (2012-2017).

REFERENCES

Barr, H. L. and Langs, R. (1972). LSD: Personality and Experience. Wiley-Interscience, New York.

Bech, P., Rafaelsen, L., and Rafaelsen, O. (1973). Cannabis and alcohol:

Effects on estimation of time and distance. Psychopharmacologia (Berlin), 32, 373-381.

Braus, D. F. (2002). Temporal perception and organisation, neuronal synchronization and schizophrenia. Fortschr Neurol Psychiatr, 70, 591–600.

Davalos, D., Kisley, M. and Ross, R. (2002). Deficits in auditory and visual temporal perception in schizophrenia. Cog Neuropsychiat, 7, 273–282.

Davalos, D., Kisley, M. and Ross, R. (2003). Effects of interval duration on temporal processing in schizophrenia. Brain Cogn, 52, 295–301.

Dittrich, A. (1998). The standardized psychometric assessment of altered states of consciousness (ASCs) in humans. Pharmacopsychiatry, 31, 80–84.

Duits, Ch. (1994). Le Pays de l'éclairement. Le bois d'Orion. L'Isle-sur-la-Sorgue, France.

Dokic, J. and Martin, J-R. (2012). Disjunctivism, hallucinations, and metacognition. Wiley Interdisciplinary Reviews: Cognitive Science, 3 (5), 533–543.

Dreyfus, H. (1987). Alternative philosophical conceptualizations of psychopathology. In Durfee, H. A., Rodier, D. F. T. (Eds.), Phenomenology and Beyond: The Self and its Language. Kluwer Academic, Dordrecht, pp. 41-50.

Ellis, H.D. (1996). Delusional misidentification of inanimate objects: A literature review and neuropsychological analysis of cognitive deficits in two cases. Cognit. Neuropsychiatry, 1, 27–40.

Elvevag, B., McCormack, T., Gilbert, A., Brown, G. D., Weinberger, D. R. and Goldberg, T. E. (2003). Duration judgements in patients with schizophrenia. Psychol Med, 33, 1249–1261.

Friedman, W. (1990). About Time: Inventing the Fourth Dimension. MIT Press, Cambridge, US.

Gallagher, S. (2005). How the Body Shapes the Mind. Oxford University Press, Oxford, UK.

Gallagher. (1998). The Inordinance of Time. Northwestern University Press, Evanston.

Gallagher, S. (2009). Delusional realities. In Bortolotti, L., Broome, M. (Eds.), Psychiatry as Cognitive Neuroscience. Oxford: Oxford University Press, Oxford, pp. 245-66.

Gallagher, S. (2012). Phenomenology. Palgrave-Macmillan, London.

Gallagher, S. and D. Zahavi. (2012). The Phenomenological Mind, 2nd ed.

Routledge, London.

González, J.C. (2010a). Du concept “hallucinogène” au concept “lucidogène” (aller-retour). In Baud, S., Ghasarian, C. (Eds.), Des Plantes Psychotropes (195-232). Ed. Imago, Paris.

González, J. C. (2010b). On pink elephants, floating daggers and other philosophical myths. Phenomenology and the Cognitive Sciences, 9, 193–211.

González, J. C. (in press). Traditional Shamanism as embodied expertise on sense and non-sense. In Cappuccio, M., Froese, T. (Eds.), Enactive Cognition at the Edge of Sense-Making. Palgrave Macmillan, London.

González, J.C. and Dokic, J. (2009). Hallucination: Vrai ou faux? Cerveau & Psychologie, 31, 49-51.

Grof, S. (2006). When the Impossible Happens. Adventures in Non-Ordinary Realities. Sounds True, Inc. Canada.

Heidegger, M. (1968). Being and Time. Trans. J. Macquarrie and E. Robinson. Harper and Row, New York.

Heimann, H. (1994). Experience of time and space in model psychoses. In Pletscher, A., Ladewig, D. (Eds.), 50 Years of LSD. Current Status and Perspectives of Hallucinogens. Parthenon Publishing Group, New York.

Hobson, J. A. (2005). Sleep is of the brain, by the brain and for the brain. Nature, 437 (7063), 1254-1256.

Hollister, L. E. (1978). Psychotomimetic drugs in man. In Iverson, L., Iverson, S., Snyder, S. (Eds.), Handbook of Psychopharmacology Vol. 11. Plenum Press, New York, pp. 389-424.

Husserl, E. (1991). On the Phenomenology of the Consciousness of Internal Time (1893-1917). Trans. J. B. Brough. Collected Works: Volume 4. Kluwer Academic Publishers, The Hague.

Husserl, E. (1998). Thing and Space: Lectures of 1907. Trans. and ed. by R. Rojceicz. Collected Works: Volume 7. Kluwer Academic Publishers, Dordrecht.

Huxley, A. (1990). The Doors of Perception & Heaven and Hell. Harper & Row, New York.

James, W. (1890). The Principles of Psychology. Dover, New York, 1950.

Jones, R. T. (1978). Marihuana: Human effects. In Iverson, L., Iverson, S., Snyder, S. (Eds.), Handbook of Psychopharmacology Vol. 12. Plenum Press, New York, pp. 373-412.

Kafka, J. S. (1989). Multiple Realities in Clinical Practice. Yale University Press, New Haven.

Kant, I. (1965). Critique of Pure Reason, Trans. N. K. Smith. St. Martin's Press, London. References given to the second ("B") edition (1787) pagination.

Lehmann, A. and González, J. C. (2009). L'hallucination: entre rêve et perception. Cerveau & Psychologie, 31, 44-48.

Lieving, L. M., Lane, S. D., Cherek, D. R., & Tcheremissine, O. V. (2006). Effects of marijuana on temporal discriminations in humans. Behavioural pharmacology, 17 (2), 173-183.

Mansky, P. A. (1978). Opiates: Human psychopharmacology. In Iverson, L., Iverson, S., Snyder, S. (Eds.), Handbook of Psychopharmacology Vol. 12. Plenum Press, New York, pp. 95-185.

Mathew, R. J., Wilson, W. H., G Turkington, T., & Coleman, R. E. (1998). Cerebellar activity and disturbed time sense after THC. Brain research, 797 (2), 183-189.

Meck, W. (1996). Neuropharmacology of timing and time perception. Cog Brain Res, 3, 227–242.

Meck, W. H. and Benson, A. M. (2002). Dissecting the brain's internal clock: how frontal–striatal circuitry keeps time and shifts attention. Brain and cognition, 48 (1), 195-211.

Merleau-Ponty, M. (1962). Phenomenology of Perception. Trans. C. Smith. Routledge and Kegan Paul, London.

Michaux, H. (1972). Misérable miracle: La mescaline. NRF, Gallimard. Paris.

Minkowski, E. (1970). Lived time: Phenomenological and Psychopathological Studies. Northwestern University Press, Evanston.

O'Boyle, D. J., Freeman, J. S. and Cody, F. W. J. (1996). The accuracy and precision of timing of self-paced, repetitive movements in subjects with Parkinson's disease. Brain, 119, 51–70.

Ornstein, R. E. (1969). On the Experience of Time. Penguin, Baltimore.

Rammsayer, T. (1989). Dopaminergic and serotoninergic influence on duration discrimination and vigilance. Pharmacopsychiatry, 22 (Suppl.1), 39–43.

Rammsayer, T. (1999). Neuropharmacological evidence for different timing mechanisms in humans. Q J Exp Psych, 52B, 273–286.

Reuter, M., Peters, K., Schroeter, K., Koebke, W., Lenardon,. D, Bloch, B. and Hennig, J. (2005). The influence of the dopaminergic system on cognitive functioning: a molecular genetic approach. Behav Brain Res, 164, 93–99.

Rorty, R. (2003). Out of the Matrix: How the late philosopher Donald Davidson showed that reality can't be an illusion. Boston Globe (10/5/2003). http://www.boston.com/news/globe/ideas/articles/2003/10/05/out_of_the_mat

Sass, L. (1992). Heidegger, schizophrenia and the ontological difference. Philosophical Psychology, 5, 109-132.

Schenk, T. and Zihl, J. (1997). Visual motion perception after brain damage: I. Deficits in global motion perception. Neuropsychologia, 35, 1289-1297.

Schutz, A. (1974). Collected Papers Vol. 1. The Problem of Social Reality. Springer, Dordrect.

Shanon, B. (2002). The Antipodes of the Mind: Charting the Phenomenology of the Ayahuasca Experience. Oxford University Press, Oxford.

Tenckhoff A, Tost H, Braus D F (2002) Altered perception of temporal relations in schizophrenic psychoses. Nervenarzt, 73, 428–433.

Tinklenberg, W. J., Kopell, B. S., Melges, F. T., & Hollister, L. E. (1972). Marihuana and alcohol: Time production and memory functions. Archives of General Psychiatry, 27, 812-815.

Vollenweider, F. X. (1998). Advances and pathophysiological models of hallucinogen drug actions in humans: A preamble to schizophrenia research. Pharmacopsychiatry, 31, 92–103.

Vollenweider, F. X., & Geyer, M. A. (2001). A systems model of altered consciousness: integrating natural and drug-induced psychoses. Brain research bulletin, 56(5), 495-507.

Volz H P, Nenadic I, Gaser C, Rammsayer T, Hager F, Sauer H. (2001). Time estimation in schizophrenia: an fMRI study at adjusted levels of difficulty. Neuroreport, 12, 313–316.

Wittmann, M., Carter, O., Hasler, F., Cahn, B. R., Grimberg, U., Spring, P. & Vollenweider, F. X., et al. (2007). Effects of psilocybin on time perception and temporal control of behaviour in humans. Journal of Psychopharmacology, 21(1), 50-64.

Zihl, J., von Cramon, D., and Mai, N. (1983). Selective disturbance of

movement vision after bilateral brain damage. Brain, 106, 313-340.

18. Neuropsychology of Spiritual and Mystical States

by Eugene G. d'Aquili & Andrew B. Newberg
University of Pennsylvania.
Hospital of the University of Pennsylvania, Philadelphia.

An analysis of the underlying neurophysiology of aesthetics and religious experience allows for the development of an Aesthetic/Religious Continuum. This continuum pertains to the variety of creative and spiritual experiences available to human beings. This may also lead to an understanding of the neurophysiological mechanism underlying both "positive" and "negative" aesthetics.

An analysis of this continuum allows for the ability to understand the neurophenomenological aspects of a variety of human experiences ranging from relatively simple aesthetic experiences to profound spiritual and unitary states such as those obtained during meditation. However, it may be possible, through a neuropsychological analysis to determine the similarities that exist across such experiences. Thus, certain parts of the brain may be functioning in similar ways during different experiences.

It may be the case that the specific neuropsychological components of a given experience may depend on the strength of the affectual response of the person and the ability to mark such experiences as significant. Further, even though similar structures may be functioning during different experiences, their inhibitory and excitatory interactions may be different. Finally, by considering the Aesthetic/Religious Continuum, we may eventually arrive at a better understanding of how we experience and define reality.

Introduction

Friederich Nietzsche, following the ancient Greek model, divided aesthetics into a kind of positive aesthetics which he called Apollonian and a negative aesthetics which he called Dionysian (Nietzsche 1994). Apollonian aesthetics represent what is usually considered the aesthetics of beauty and light. It is comprised of a sense of wholeness and harmony, and is affectively marked by a sense of pleasantness, at the very least, and often a sense of joy

or elation. Dionysian aesthetics, on the other hand, named after the myth of Dionysus being torn apart alive by the Bachae, is marked by a sense of fragmentation, disharmony, death or dying, and is affectively marked by sadness and melancholy, at least, and often by a sense of fundamental hopelessness, futility, and even terror.

Based on ancient philosophers, the medieval scholastics defined the essential characteristics of positive aesthetics as 1) Integritas or wholeness, 2) Consonantia Partium or harmony of parts, and 3) Claritas Formae or a radiance of form (Eco 1988). Thus for a work of art to have a positive aesthetic the medievals required that it generate an overall sense of wholeness and a sense of harmony of its composite parts. The radiance or clarity of form seems to have referred to the emotional effect on human beings which should be at the very least pleasant, and hopefully edifying and joyful.

The medieval scholastics were hesitant to deal with negative aesthetics, since, in their view, negative aesthetics were diabolical, while positive aesthetics were from God. Nevertheless, since they followed the ancients, they did summarily treat negative aesthetics. To a great extent, although not completely, the defining characteristics of negative aesthetics were considered to be the opposites of those defining positive aesthetics (Eco). They were: 1) Integritas in Fragmentatione or wholeness in fragmentation, 2) Dissonantia Partium or disharmony of parts, and 3) Tenebra Formae or darkness of form. It is interesting that if the defining characteristics of negative aesthetics were simply the opposite of the defining characteristics of positive aesthetics, then the first characteristic of negative aesthetics should be Fragmentatio or fragmentation, pure and simple. But the medievals insisted that, for a work of art to be a work art, however diabolical, and not simply a rendering of the horror of human life, there had to be some sense of wholeness or integrity even if the subject matter itself fragmented. Thus, for a medieval aesthetician, and probably for an ancient one as well, “Guernaca” or “Waiting for Godot” are works of art at least because they are defined spatially and temporally, by a frame in the case of “Guernaca” and by the production time and temporal sequencing in the case of

“Waiting for Godot.” The medievals would probably maintain that the use of words, and possibly of sentences, and the delimitation of formal elements within a painting contribute to the formal wholeness in spite of the fragmentation of overall subject matter. So much for the criterion of

wholeness within fragmentation. The other two characteristics of negative aesthetics for the scholastic are simply the opposite of the second and third characteristics of positive aesthetics. By this we mean a disharmony of parts and a darkness of form. As in the case of Claritas Formae, Tenebra Formae also describes the emotional response to a work of negative aesthetics, i.e. sadness, futility, hopelessness, and horror.

Throughout most of human history, positive or Apollonian aesthetics have tended to be synonymous with aesthetics in general. Of course there have been counter-examples, particularly among the Greeks and Romans. But even among them, Apollonian aesthetics tended to define beauty. It is only in the 20th century, particularly in the West, that the negative aesthetic has come into its own. With the weakening of religious belief systems in the West, the existential sense of a futile, empty, and hopeless world has provided the ground for negative or Dionysian aesthetics to become a dominant manifestation of art. But whether art is Dionysian or Apollonian, it appears that, one way or another, a sense of wholeness is, to some extent at least, essential for aesthetic appreciation. The crucial importance of this, and how it relates to religious experience will become more obvious as we examine the neuropsychology of the Aesthetic-Religious Continuum.

The Neuropsychology of the Aesthetic-Religious Continuum

To understand the neuropsychology underlying both aesthetics and religious experience, we must first present some background material concerning primary epistemic or knowing states. We have previously defined nine primary epistemic or knowing states (d'Aquili 1982). Of these nine only six relate to a world of multiple discrete reality while the other three relate to Absolute Unitary Being (AUB) which is a state, usually arising out of profound meditation, in which there is no perception or awareness of discrete beings, no perception of space or time, and in which even the self-other dichotomy is obliterated (d'Aquili and Newberg 1993a). In our analysis of the neuropsychology of aesthetics, and in our preliminary analysis of the neuropsychology of religious states, we are only concerned with the six primary epistemic states which deal with multiple discrete reality.

Of these six states three are inherently unstable involving irregular relationships between the elements of discrete reality, often caused by drugs or various forms of psychosis or dementia. For the purposes of this paper we

are only concerned with the three stable states involving the perception of multiple discrete reality and regular relationships between elements of that reality. The first such state is characterized by neutral affect. We have called this baseline reality, and it is presumably the reality that comprises our everyday perceptions and behaviors. The second primary epistemic state which will be of concern to us is multiple discrete reality with regular relationships suffused with positive affect. This is similar to the state that Bucke (1961) called Cosmic Consciousness. The third primary epistemic state involving multiple discrete reality and regular relationships is suffused by negative affect and has been called Weltschmerz.

Let us take a few moments to describe these states in more detail. The first of these states, which we call the "baseline" state, involves the perception of discrete entities comprising the world that are related to each other in regular and predictable ways. The affective valance of this world perception is neutral. We presume it is the state that most of us are in at this moment; for example, most are of us are quite certain of the reality of the furniture and people surrounding us. Very few, if any of us, would question the fundamental reality of the state we are in. It is precisely because this state appears certainly real while one is in it that it is a primary epistemic state. Furthermore, most individuals would consider this state as the only reality or the only valid epistemic state. Nevertheless, the fact is that not only is this sense of reality not unique, but there are two other stable perceptions of discrete reality which are also primary. These other two states are similar to the state most of us are in most of the time in that the regularities of time, space, and causality are the same and in that there is the perception of the same discrete entities in the world. They differ from baseline reality only in affective valance, positive or negative, as opposed to neutral, which usually suffuses the perception of the world.

The second primary epistemic state or "sense of reality" involves the same discrete entities and regularities as the baseline ordinary state, but it involves an elated sense of well being and joy, in which the universe is perceived to be fundamentally good and all its parts are sensed to be related in a unified whole. In this state there is usually a sense of purposefulness to the universe and to a human individual's place in the universe. This sense of purposefulness may defy logic and certainly does not arise from logic; nonetheless it is a primary stable and certain perception. The onset of such an

exhilarating view of reality is usually sudden and has been described as a conversion experience. It has been delineated repeatedly in the religious literature of the world. In the psychiatric literature, it was most carefully described by Richard M. Bucke (1961) in a remarkable book entitled, Cosmic Consciousness. Since the publication of this volume in 1901 it has undergone some 22 editions, the latest in 1969. Bucke had this experience himself, and in his magnum opus, he presented evidence of similar experiences in the lives of many people including the Buddha, Socrates, St. Paul, Francis Bacon, Blaise Pascal, Bendict Spinoza, and William Blake as well as many of his own contemporaries.

A third primary sense of reality is also a very stable one. It is like the first two in that it deals with the world of multiple discrete being and has the same high degree of regularity of causal, spatial, and temporal relationships. It differs from the first two in that the basic affective valance toward the perceived universe is profoundly negative. It has been called Weltschmerz in the psychiatric literature and consists of a sense of exquisite sadness and futility, as well as the sense of the incredible smallness of human beings in the universe, the inevitable existential pain generated by being in the world, and the suffering inherent in the human condition. Usually, there is the perception of the whole universe as one vast pointless machine without purpose or meaning. In its full blown form, it is similar to Cosmic Consciousness in that it usually occurs with a suddenness that leaves the individual totally perplexed. The individual experiences a profound sense of loss and meaninglessness to the world which rarely leaves. It is the basic sense of reality which appears to underlie much existentialist thought, particularly in French existentialist literature. It is the sort of perception in which the universe is apprehended not in any way as neutral but as essentially absurd, and often suicide is thought to be the only truly human response.

It seems that the primary epistemic states that we have considered actually make up a spectrum or continuum of unitary states in which the sense of unity increasingly transcends the sense of diversity.

At one end of this unitary continuum, close to baseline reality, was the experience of positive or Apollonian aesthetics. Again the sense of wholeness or Integritas was greater than the diversity of parts. It seemed that this was true in the appreciation of a sunset or a symphony. We postulated that the posterior superior parietal lobule (PSPL) and certain parts of the inferior

parietal lobule, particularly on the non-dominant side, were involved in the imposing of greater unity over diversity. Thus, as one moves up the unitary continuum with progressively greater experience of unity over diversity, one moves out of the realm of aesthetics and into a realm that would more properly be characterized as religious experience.

A transitional phase between aesthetic and religious experience may be romantic love which might be characterized by the phrase, "it is bigger than the both of us." As one moves up this continuum, one moves through the experience of numinosity or religious awe, into Bucke's state of Cosmic Consciousness, properly so called. As one continues along this spectrum beyond Cosmic Consciousness, one moves into various trance states in which there is a progressive blurring of the boundaries between entities until one finally moves into Absolute Unitary Being. As soon as one moves into AUB, one is in another primary epistemic state. This is because, AUB is characterized by absolute unity. There are no longer any discrete entities which relate to each other. The boundaries of entities within the world disappear and even the self-other dichotomy is totally obliterated. In AUB there is no extension of space or duration of time. If this state is suffused with positive affect, it is interpreted, after the fact, as the experience of God or the Unio Mystica. If it is suffused with neutral affect, it is experienced, non personally, as the Void or Nirvana of Buddhism. We have previously postulated that moving up this continuum was at least partially due to progressive deafferentation of (or blocking neural input to) the posterior superior parietal lobe and possibly adjacent areas of the brain (d'Aquili and Newberg 1993a, 1993b). We proposed that total deafferentation resulted in the total and absolute unitary experience of AUB.

In testing our hypothesis that progressive deafferentation of the posterior superior parietal lobe and parts of the inferior parietal lobe, particularly on the non-dominant side, was responsible for a progressive increase in unitary experience as we go up the Aesthetic-Religious Continuum, we were gratified to find that single photon emission computed tomography brain imaging of accomplished Tibetan Buddhist meditators yielded results compatible with deafferentation in these areas during profound unitary states (Newberg, Alavi, Baime, Mozley and d'Aquili 1997). However, we still must perform additional brain imaging studies to clearly delineate whether each point along the AestheticReligious Continuum is marked by progressive

deafferentation of these areas. culminating in total deafferentation during AUB. Thus, the evidence is suggestive that positive or Apollonian aesthetics represents the beginning of the aesthetic-religious continuum along which various spiritual and mystical experiences are placed culminating in either the experience of God or of the Buddhist Void.

Negative or Dionysian

Although some of the mechanism of the Apollonian esthetic and its relationship to spiritual and mystical experiences remains speculative, we are accumulating increasing evidence regarding the specific aspects of that neurophysiological mechanism. The same cannot be said of Dionysian aesthetics. Here we have fragmentation associated with some degree of wholeness. As with the medieval analysis, so with the neuropsychological analysis that the Dionysian is not simply the opposite of the Apollonian. We have described that senses of unity may arise from the progressive deafferentation of the posterior superior parietal lobe.

The blocking of input into this brain structure may result in a decreased sense of self and other, a decreased sense of space and time, and an overall sense of unity among discrete objects. Fragmentation, on the other hand, may result from an increased input into the posterior superior parietal lobe, i.e. the opposite of deafferentation. Thus, the posterior superior parietal lobule and certain adjacent structures in the inferior parietal lobule on the non-dominant side may become hyperexcited and overloaded with input. The inability to process and modulate all this input may result in the subjective sensation of fragmentation, hopelessness, and fundamental disorder to the universe resulting paradoxically in a sense of emptiness and futility which seems to be inherent in the universe.

The problem with Dionysian aesthetics is that, at the same time that negativity and fragmentation exists in a work of art, certain wholeness or integrity must exist simultaneously in order for the work to be experienced precisely as art. The only speculation as to how this might come about neurophysiologically is that at the same time that there is hyperstimulation of the PSPL on the nondominant side, there is some degree of deafferentation in the homologous PSPL on the dominant side. We have postulated that the involvement of the PSPL on both sides occurs in certain mystical states (d'Aquili and Newberg 1993a, 1993b), so this mechanism is not absurd.

Whether it is, in fact, what occurs has yet to be seen. Further studies and analysis will be required in order to more fully elucidate the underlying mechanism underlying Dionysian aesthetics. We have focused on the aesthetic end of the Aesthetic-Religious Continuum in this paper thus far. Let us return to some considerations at the religious experience end of the Aesthetic-Religious Continuum.

Spiritual and Mystical States

We postulate that all spiritual and mystical states, at least those that have a powerful affective component, are located somewhere along a continuum that we have called the Aesthetic-Religious Continuum. These states, whether they are transitory experiences or more permanent states, occupy a place on what is probably, more or less, the second half of the Aesthetic-Religious Continuum. We admit that we have not done an exhaustive typology of unitary states. It is possible that the spiritualmystical part of the continuum may be considerably more than half or considerably less than half of the spectrum which begins with aesthetic experiences, moves through experiences of romantic love, and then begins with lower level spiritual-mystical states.

In this part of the paper we will consider these latter states only. This upper end of the Aesthetic-Religious Continuum more or less begins with experiences of religious awe such as the sort of states which occur to some individuals when confronted with the beauty and majesty of nature. With this lower level mystical experience of religious awe should probably be also classified various numinous experiences such as mandala dreams. One can then move on along the continuum to the level of Cosmic Consciousness, properly so called, as described by Bucke. In this state, there is no alteration in the perceived characteristics of the world. However there is the profound senses, which people in this state would call knowledge, that the world is fundamentally one, in its essence, profoundly good. This is “known” to be the case even in the presence of profound evil and suffering in the world. We must reiterate that Cosmic Consciousness is not a philosophical stance, although it may be turned into one. The unity and goodness of all reality is simply known to be the case anterior to any philosophy or science. One then moves along the continuum into various trance states in which the contents of the sensorium are to a lesser or greater extent distorted or modified with

reference to baseline reality.

The perception of space and time can be significantly distorted during these trance states (d'Aquili and Newberg 1993a, 1993b). Likewise, it is along this part of the Aesthetic-Religious Continuum that archetypes are often activated sometimes associated with remarkable hyperlucid hallucinations.

Here we use the term hallucination it is basic sense, that is a sensory experience which cannot be checked in baseline reality. There is no implication either of reality or non-reality. As one moves along the continuum through progressively more profound trance states with progressively more tenuous boundaries between entities in the world and between the self and the world, one eventually moves into Absolute Unitary Being. As we mentioned above, this is the absolute unitary state where self and other are obliterated, where all entities and their interrelationship are obliterated, and where space and time are obliterated.

Let us now look at how these various spiritual-mystical states are characterized. The spiritualmystical states, like all the states along the Aesthetic-Religious Continuum, can be ordered according to an experienced sense of greater unity over diversity. We have discussed this in detail above and have proposed that this progression of an increasing sense of unity can be neurophysiologically related to progressive deafferentation of the posterior superior parietal lobule and adjacent parts of the inferior parietal lobule particularly on the non dominant side. Although, in our model, the progressive unitary sense is the most important defining characteristic of spiritual-mystical states and the dimension by which various mystical states can be most rationally seen to relate to each other, there are, nevertheless three other defining characteristics of spiritual-mystical states.

As with the unitary sense these characteristics also seem to increase in intensity as one moves up the continuum towards AUB. The first of these three defining characteristics beyond the progressive unitary sense is the sense of transcendence or "otherworldliness". Actually a vague sense of transcendence seems to increase as one moves up the continuum gradually developing into a true other-worldly feeling. At present, it is unknown what is the neuroanatomical and neurophysiological substrate for the subjective sense of familiarity and its opposite unfamiliarity or strangeness. Whatever mechanism this may turn out to be, some modification of it undoubtedly

underlies the sense of transcendence. Certainly, what one experiences as one moves up the spectrum is clearly strange when compared to baseline.

A second defining characteristic of spiritual-mystical experiences beyond the fundamental unitary sense is the progressive incorporation of the observing Self in each successive experience or state. As with aesthetic experiences, so with spiritual-mystical experiences, there must be a harmonious ordering of the parts or elements of the experience. We have postulated that the underlying neural network of this harmonious ordering of parts must involve the frontal lobes, the temporal lobes, and the inferior parietal lobule (d'Aquili and Newberg 1993a, 1993b). The inferior parietal lobule especially must be correlated with the harmony since it is responsible for the sense of gradation, comparison, and opposition (Joseph 1990). What is noteworthy here is not only a harmony of parts, but that one of the parts is the observing Self. The incorporation of the observing Self, to one degree or another, is absolutely essential to a spiritual-mystical state. It is by no means essential either to aesthetic experiences or to aesthetic productions. When there is an incorporation of the observing self to some extent in an aesthetic experience, however, it is a much more powerful experience. Indeed contemporary artistic productions often explicitly attempt to involve the observer.

Although it tends to generate a more powerful aesthetic experience, involvement of the observer in the content of a work of art, particularly in theatrical productions, is not inherent in a work of art being a work of art nor is it essential for an aesthetic experience. However, it is essential for a spiritual-mystical experience. The whole point of a spiritual-mystical experience is for the Self to sense itself to be fundamentally and essentially related to some aspect of whatever ultimate reality might be. This involvement of the self in the spiritual experience or state is progressively greater as one moves up the continuum. As one moves into AUB, the Self seems to expand to become the totality of reality without individualized content. This is very compatible with the Hindu interpretation, and probably underlies Shankara's observation that the Atman (or soul) and the Brahman (or God) are one.

The Christian unio mystica is phenomenologically the same, although care is taken by Christian theologians who reflect on this state to preserve the ontological independence of the soul. They would agree that in this state the

union of God and the individual soul is so perfect and so complete that an observer, if such were possible, could not perceive where one ended and the other began.

Nevertheless, for theological reasons, Christian mystical theologians maintain the ontological integrity of the individual although they would concede that the individual has, as it were, expanded to a perfect and a simple union with God. One often hears it said that in profound mystical experiences such as AUB the Self becomes as a drop of water in the ocean of reality. What actually appears to happen is that the Self, far from being a drop of water in an ocean, actually expands to become the totality of reality. When Europeans first came into contact with some Hindu sects, they were shocked and scandalized when they learned that part of ritual worship required the repeated assertion "I am God, I am God, I am God."

What confused the Europeans was that the "I" in the statement did not refer to the individual conscious ego with all its evil proclivities, but rather to the Self or Atman which is the deepest unconscious core reality of an individual. It is in this sense that every individual can truly state "I am God" because each individual can potentially expand into a state of AUB. A Hindu who states "I am God" is all the while perfectly aware of the shortcomings and failings of his conscious ego in day to day life. No religious tradition that we are aware of has ever advocated that an individual proclaim "I am God" where the "I" would refer to the conscious ego. That would indeed be blasphemy. Worse than blasphemy, it would be absurd.

The third defining characteristic of spiritual-mystical experiences beyond the unitary sense is the intense and progressive certainty as one moves up the unitary continuum of the objective reality of the mystical experiences (d'Aquili and Newberg 1993a, 1993b). A good example of this is the relatively common near death experience (NDE). This occurs in the area along the unitary continuum that we have called trance states. In its complete form, which is not too common in our society, the NDE appears to consist of the sequential constellation of two archetypes, first what we have called the Archetype of Dissolution followed by the Archetype of Transcendent Integration (Newberg and d'Aquili 1994). The first consists of hellish experience involving torture, dismemberment and other terrifying horrors. Often demons are involved and the experience is described as Hell among individuals whose religious tradition incorporates a concept of Hell. In fact,

we would suggest that in the evolution of religious phenomenology, the concept of Hell may be derived from this terrifying experience. If allowed to take its course, the Archetype of Dissolution is followed by the Archetype of Transcendent Integration. This is the aspect of the near death experience that is described in present day literature (Moody 1975; Ring 1980). It involves the experience of moving through a tunnel often emerging in a breathtakingly beautiful landscape. The individual is often met by deceased relatives or friends, and in other cultures often by saints or Gods. This is usually followed by an encounter with a Being of Light and a rapid life review within the context of being totally and completely loved. Subjects recount that what is especially upsetting is reviewing one's own acts of selfishness or cruelty within the context of being unconditionally loved. At this point, the individual either decides or is informed that he or she must return to their body. This sequence of two archetypes, one terrifying beyond belief, the second involving a sort of celestial exaltation, joy, and love, together seem to form the complete near death experience.

Description of these biphasic "other world journeys" are well described in medieval spiritual literature and in the experience of other cultures as well (Zaleski 1987). This is especially true in the Tibetan Book of the Dead where the horrible and demonic chonyid state is described as a prelude to a state remarkably similar to the Archetype of Transcendent Integration (Freemantle and Trungpa 1987). The hellish Archetype of Dissolution has been described often enough in our in culture as to know that it certainly exists. Why do the great majority of individuals in our culture who have a near death experience have only, or remember only, the Archetype of Transcendent Integration is not known. We have speculated upon this in another work (Newberg and d'Aquili 1994). What is important here, however, is that almost all individuals who have had complete core experiences, especially involving the realm of light and the life review, are absolutely certain of the objective reality of their experience. This is true not only among an educated person but even among the most educated philosophers and scientists. This is apparently true among neuroscientists as well.

After reviewing many reports of core near death experiences we have been able find only one instance of a neuroscientist maintaining a tentative and somewhat skeptical stance after his experience. Furthermore the tone of his reservations was muted and agnostic allowing for the possibility of some

sort of objective reality to be experienced. We do not claim to have made an exhaustive study, but all other scientists and philosophers as well as ordinary individuals, and including a number of neuroscientists, seem to maintain a quiet certainty of some sort of objective reality to their near death experience. Furthermore, people who have had the core NDE no longer appear to fear death (Ring 1980). And the lives of near death experiencers are nearly always dramatically changed in the direction of increased altruism and a generally more benevolent attitude towards family, friends, and indeed the world. Many of those who came out of a religious tradition seem to return to it, but many do not.

These experiences and their consequences in the lives of the near death experiencers are indeed amazing, and have generated a number of studies by sociologists interested in the social effects of the change in the lives of these individuals. What is clear is that almost every individual who has had a core NDE is quietly certain of the objective reality of their experience. It is interesting that almost all of the near death experiencers are not eager to proselytize, and they are not upset when they are not believed. When we discussed his experience with a neuroscientist he readily conceded that there may be neural correlates to the experience. He stated however that there are neural correlates to everyday experience, and this did not make him doubt the existence of the external world. We have considered the near death experience because it is relatively common and well reported.

The certainty of the objective reality of mystical experiences at the upper end of the AestheticReligious Continuum is just as great, and, if possible, greater than the certainty of the reality of the near death experience. Individuals who have experienced AUB seem to be uniformly absolutely certain that they have been in contact with ultimate reality, however that may be subsequently interpreted in terms of their specific religious traditions. The certainty of the objective reality of that state seems to be absolute.

We have described the defining characteristics of mystical or spiritual experiences as: 1) progressive increase of unity over diversity, 2) progressive sense of transcendence or “otherworldliness, 3) progressive incorporation of the observing Self in the experience or state, and 4) a progressive increase of certainty in the objective existence of what was experienced in the spiritual-mystical state. This approaches absolute certainty especially for those states high on the unitary continuum involving hyperlucid experiences.

Reality and Phenomenology

All this leaves us with the interesting situation of what might be called superior and inferior realities with respect to baseline. For example certain states may be considered inferior in that, when they are recalled from the baseline state, they are not perceived to be real. Examples such as dreams or psychoses, while they may be considered real while one is in them, are almost always considered not to be real when the dreamer awakens or the psychotic person returns to the baseline state after being treated with certain medications. The individual may state "that was just a dream" or "I was crazy then before I took my medications." However, there are a number of states, particularly hyperlucid experiences, which are considered more real than baseline reality even when they are recalled in baseline reality. We have already presented the near death experience as a fairly common example of one such state. What is one to make of non-psychotic individuals calmly asserting that certain altered states of consciousness represent an objective reality more certainly real than the reality presented in baseline consciousness? And what do we mean when we say that something is "real", in any case?

In a previous work we have systematically demonstrated that the various criteria often presented by which we judge something to be "real" can all be reduced in one way or another to only one criterion, and that is the vivid sense that something is real (d'Aquili and Newberg 1998). This vivid sense has been called the phantasia catalyptica by the stoics or Anwesenheit by certain modern German philosophers. It is what Dr. Samuel Johnson referred to when disputing Bishop Berkeley's idealism. While discussing this with his friends he is said to have explained "I answer Bishop Berkeley thus." With this he kicked a stone with great force which happened to be beside the path on which they were walking. This is known as the "sore toe" school of epistemology. Nevertheless the stone had a compelling presence as do the people, furniture, buildings, etc., with which we interact in baseline reality. Space does not permit us to go into this issue in detail in this paper.

Suffice it to say reality seems to consist fundamentally only of the vivid sense of reality, or, as some would say reality is constituted by compelling presences. If this can systematically be shown to be true, and we believe that we have done so, then spiritual or mystical states of reality recalled in the

baseline state as more certainly representing an objective condition than what is represented in the sensorium of the baseline state, must be considered real. There can be no other conclusion no matter how one comes at it. This may present many problems which must be worked out, but the essential or underlying reality of hyperlucid experiences must be said to be real or the term reality has no meaning whatsoever. It is such considerations which put us, even against our will, in the presence of what Otto called the mysterium tremendum et fascinans.

19. Brain, Science, Spirituality, Religious Experience

by Andrew B. Newberg & Jeremy Iversen
Hospital of the University of Pennsylvania, Philadelphia.
Stanford University, Stanford, California.

Abstract

In this chapter, we review some of the basic issues regarding the neuroscientific studies associated with religious and spiritual experiences. Such an analysis is crucial for developing a comprehensive neurotheology that has a strong "neuro" as well as "theology" component. We will consider many of the recent advances in the study of brain function including neurochemical changes that are associated with various brain states and how such changes might be integrated into an overall model of religious experiences. While much of this neuroscientific analysis has aimed at specific religious and spiritual practices such as meditation or prayer, there are also

implications for a wide array of spiritual experiences. Such an approach can ultimately lead to hypotheses that can form the basis for future studies of religious and spiritual phenomena.

Introduction

Neurotheology is an emerging discipline that integrates religious and spiritual concepts with neurological and neuropsychological analyses. Thus, both the neurological and theological perspectives must be considered if one is to find the best way of understanding both the human brain, and how that brain perceives and experiences religion. Much of the early foundations for neurotheology have been developed by scholars such as Rhawn Joseph (1996, 2000), James Austin (1998), and the late James Ashbrook (Ashbrook, 1984; Ashbrook & Albright, 1997) and Eugene d'Aquili (Laughlin, & d'Aquili, 1974; d'Aquili, Laughlin, & McManus, 1979). These scholars took a close look at how the neurosciences might inform us about religion and religious experience. While there are a tremendous number of issues within this field of study including how the neurosciences might approach religion, theology, religious experience, religious expression, religious practice, ritual, and myth, it is important to understand what neuroscience can do and what it cannot do. Realizing the scope and limitations of neuroscience within the study of neurotheology will provide a more rational and appropriate pursuit of this topic.

The purpose of this chapter is to explore more specifically, the current understanding of neuroscience in the context of religious experience and to provide a framework for the possibility of future empirical research studies that are a cornerstone to the developing field of neurotheology. This requires a review of the current state of neuroscience including the use of many newer imaging technologies and consider how such approaches might be applied to a broad array of religious issues. This chapter will not delve into the specific phenomenological differences between religions and religious experiences, although it must be clearly stated at the outset that while a given neuroscientific experiment might require limiting religion to a specific parameter, the broader scope of religion and religious experiences must not be lost. In other words, for neuroscience to properly be performed, there may be restrictions placed on the types of experiences that can be studied and how they may be studied. However, this should not imply that these restrictions

alter or diminish the actual experiences and feelings people may have about their experiences.

There are many types of practices and experiences that can be considered to be a part of a neurotheological analysis. These practices can include those described as spiritual, religious, or meditative and while there may be specific distinctions between these, it should be realized that there is significant overlap as well. Thus, these terms can be used loosely or very explicitly and since many of the existing research studies have defined their terms more broadly, it seems appropriate for now to consider these terms more generically. However, where possible, more specific terms will be used.

Furthermore, as future neurotheological research is developed, more care must be given to describing the specific practices and experiences under investigation. This also has implications for the conclusions drawn from such research so that it can be clearly determined how certain practices and experiences affect the body and brain's physiology.

In order to explore the "neuro" side of neurotheology, we will begin by establishing the current state of the science and how this has been applied to religious experience. We will then consider how basic neuroscientific approaches might be applied to a model of religious experiences. Finally, we will expand upon possible avenues of future research that might allow for a more detailed analysis of religious experiences.

Neuroimaging Techniques and Religious/Spiritual Practices

Functional and anatomical neuroimaging techniques have contributed dramatically to our understanding of the causes of various neurological disorders and in their diagnosis and management. Anatomical imaging techniques such as magnetic resonance imaging (MRI) and x-ray computed tomography (CT) are useful for determining structural changes in the brain. Functional imaging methods such as single photon emission computed tomography (SPECT) and positron emission tomography (PET) have been useful for measuring changes in blood flow, metabolism, and neurotransmitter activity in neuropsychiatric processes.

In the past decade, brain activation studies have utilized neuroimaging techniques to measure cerebral function during various behavioral, motor, and cognitive tasks. These studies, usually utilizing PET or SPECT, and more recently functional MRI, have helped to determine which parts of the brain

are responsible for a variety of neurocognitive processes. These imaging techniques have also delineated complex neural networks and cognitive modules that have become a basis for neuroscience research. Activation studies using PET and SPECT imaging techniques have been employed to determine the areas in the brain that are involved in the production and understanding of language, visual processing, and pain reception and sensation (Phelps & Mazziotta, 1985; Phelps, Kuhl, & Mazziotta, 1981; Friston, et al., 1992). Functional MRI, which has been extensively developed in the past several years, has been shown to have high resolution in measuring changes in cerebral activity during various cognitive, sensory, and motor activation tasks (Rao, et al., 1995; Hammeke, et al.,

1994; Binder, et al., 1994; McCarthy, et al., 1994; Sergent, 1994). Since most religious/spiritual practices and their concomitant experiences might be considered from the perspective of an activation paradigm, functional brain imaging techniques may be extremely useful in detecting neurophysiological changes associated with those states.

One of the particularly relevant advantages of PET and SPECT is that in addition to general brain function as measured by cerebral blood flow and metabolism, these imaging techniques offer the opportunity to explore a wide variety of neurotransmitter systems within the brain. In fact, a large number of radiopharmaceuticals have been developed over the past thirty years that may be of use for studying the effects of religious/spiritual practices and experiences. Neurotransmitter analogues have been developed for almost every neurotransmitter system including the dopamine, benzodiazepine, opiate, and cholinergic receptor systems (Kung, 1991; Diksic & Reba, 1991; Gatley, et al., 1991; Frost, 1992). A partial listing of available radiopharmaceuticals for both PET and SPECT are given in Tables 1 and 2. These, in addition to many others, may be useful in the future investigation of the neurophysiological correlates of meditative states as we will describe in more detail in this chapter.

Each of the functional imaging techniques provides different logistical and technical advantages and disadvantages for the study of meditation and other spiritually related experiences. Functional magnetic resonance imaging, while having improved resolution over SPECT and the ability for immediate anatomic correlation, would be very difficult to utilize for the study of such practices because of the noise from the machine and the problem of having to

lie prone in the machine (although there may be some ways around this). While PET imaging provides better spatial resolution than SPECT, if one strives to make the environment relatively distraction free to maximize the chances of having as strong a meditative experience as possible, it is sometimes beneficial to perform these studies off hours (especially if there is a busy clinical service). This may complicate the use of PET because the radiopharmaceuticals such as fluorodeoxyglucose may not be readily available. Thus, while PET and fMRI offer certain technical advantages, SPECT also provides a potential option for the study of spiritual practices (Newberg, et al., 2001). In a SPECT study of Tibetan Buddhist meditation by our group, subjects had an intravenous line placed and were injected with a cerebral blood flow tracer while at rest in order to acquire a "baseline" image. They then meditated for approximately one hour until they experienced a "peak" in their meditation that was indicated by a signal from the subject during the meditation. The subjects were again injected with the tracer while they continued to meditate. The tracer is fixed in the brain at the time of injection so that when the images were acquired approximately twenty minutes later, they reflected the cerebral blood flow during the meditation practice. The baseline and meditation images were then compared to determine changes in cerebral blood flow.

The findings of this study showed marked increases in the bilateral frontal cortices, cingulate gyrus, and thalami. A decrease in blood flow was noted in the superior parietal lobes bilaterally with the left more affected than the right. Interestingly, the decreases in the superior parietal lobes correlated with the increases in the thalami, suggesting a complex network that affects multiple brain areas during meditation.

The other brain imaging studies of meditation have utilized both fMRI and PET. The fMRI study by Lazar et al (2000) and the PET study by Herzog et al (1990-1991) both demonstrated increased activity in the frontal areas, particularly the prefrontal cortex. They also demonstrated some decreases in the parietal regions. The results from both of these studies are consistent with our SPECT results. The study by Lazar took an interesting approach to avoiding the distraction of the

MRI noise by having subjects practice ahead of time with a tape of the sound made by the MRI machine. One PET study by Lou et al (1999) did not demonstrate increased prefrontal activity. However, this may have been due

to the fact that subjects were following a tape guiding them through the meditation which is different from our study during which the meditation was self initiated and maintained. In a similar manner, internally generated words activate the prefrontal cortex while guided word generation does not, so whether or not the PFC is activated during meditation may have to do with the type of approach used by the practitioner (Crosson et al., 2001).

One additional study is worth mentioning here in that it measured brain activity during the religious experience associated with reciting religious phrases (Azari, et al., 2001). This PET scan evaluated religious and non-religious subjects during the recitation of various phrases that either had a religious connotation (a Psalm), a happy connotation, or neutral. Their results suggested that the religious experience associated with reciting religious language was associated with an increase in the prefrontal cortex, dorsomedial frontal cortex, and medial parietal lobe. The investigators did not find a change in the activity in the limbic system in spite of an overall positive affective response to the religious recitation. The authors suggest that these areas may form a network of areas associated with religious experiences. In relation to the above mentioned studies of specific religious practices, that have also implicated the frontal and parietal areas, there appears to be at least some convergence of the findings that this frontal-parietal interaction has some role in religious and spiritual experiences.

What should be kept in mind in interpreting the results of imaging studies such as these is that they each demonstrate certain similarities and certain differences depending on the type of practice and experience. It has long been our hope to develop a comprehensive model of a few basic types of religious/spiritual practice that could then be extrapolated to explore other types of practices. We will elaborate upon that model in this chapter tying in some of the newest developments in the study of neurotransmitter systems and the physiology of spiritual experiences.

Physiological Studies of Religious/Spiritual Practices

In studies of the physiological correlates of meditation, investigators have examined both specific neurophysiological function as well as the relation of that function to various aspects of body physiology. The autonomic nervous system's responses to meditative practices typically include decreases in blood pressure, heart rate, respiratory rate, and galvanic skin responses

(Jevning, Wallace, & Beidebach, 1992; Wallace, 1970). Investigators have also performed a number of studies that measured changes in the body's neurochemistry as a result of meditation. The vast majority of these studies were performed on subjects practicing transcendental meditation. In this type of practice, originally derived from Hindu practice, the individual focuses on a particular word or phrase (the mantra) that has significant meaning to the individual. The result is a feeling of calmness, a loss of the sense of self, and the diminishment of the perception of external stimuli.

In terms of specific neurochemical changes associated with meditation and related spiritual practices. Several studies have demonstrated an increase in gamma aminobutyric acid (GABA) in the blood serum of individuals during meditation (Elias, Guich, & Wilson, 2000; Elias & Wilson, 1995). Interestingly, (GABA) is the principal inhibitory neurotransmitter in the brain and may have an important role in the inhibition of specific structures during meditation.

Serotonin (ST) is a neuromodulator that densely supplies the visual centers of the temporal lobe, where it strongly influences the flow of visual associations generated by this area (Foote, 1987). The cells of the dorsal raphe produce and distribute ST when innervated by the lateral hypothalamus (Aghajanian, Sprouse, & Rasmussen, 1987). Moderately increased levels of ST appear to correlate with positive affect, while low ST often signifies depression (Van Praag & De Haan, 1980). This has clearly been demonstrated with regards to the effects of the selective serotonin reuptake inhibitor medications such as Prozac or Zoloft which have been widely used for the treatment of depression. When cortical ST2 receptors (especially in the temporal lobes) are activated, however, the stimulation can result in a hallucinogenic effect; tryptamine psychedelics such as psylocybin and LSD seem to take advantage of this mechanism to produce their extraordinary visual associations (Aghajanian & Marak, 1999). Interestingly after meditation, breakdown products of ST in urine have been found to significantly increase suggesting an overall elevation in ST during meditation (Bujatti & Riederer, 1976; Walton, et al., 1995). The neurohormone melatonin (MT) is produced by the pineal gland, which can convert ST into MT when innervated by the lateral hypothalamus (Moller, 1992). MT has been shown to depress the central nervous system and reduce pain sensitivity (Shaji & Kulkarni, 1998). During meditation, blood plasma MT has been

found to increase sharply (Tooley, et al., 2000; Coker, 1999).

The neurochemical arginine vasopressin (AVP), produced in the supraoptic nucleus of the hypothalamus, serves many functions in the brain and body. It is a vasoconstrictor that tightens blood vessels, but also it decreases self-perceived fatigue and arousal, and appears to contribute to the general maintenance of positive affect (Peitrowsky et al., 1991; Gold & Goodwin, 1978). Increases in AVP have also been found to significantly improve the consolidation of new memories and learning (Reghunandanan, Reghunandanan, & Mahajan, 1998; Weingartner, et al., 1981). In meditators, blood plasma AVP has been found in exponentially higher levels (O'Halloran, et al., 1985).

Norepinephrine (NE) is a neuromodulator produced by the locus ceruleus of the pons (Foote, 1987). NE increases the susceptibility of brain regions to sensory input by amplifying strong stimuli, while simultaneously gating out weaker activations and cellular "noise" that fall below the activation threshold (Waterhouse, Moises, & Woodward, 1998). The breakdown products of catecholamines such as NE and epinephrine have generally been found to be reduced in the urine and plasma during meditation (Bujatti & Riederer, 1976; Walton, et al., 1995; Infante, et al., 2001). Cortisol is a hormone associated with stress responses. It is produced when the paraventricular nucleus of the hypothalamus secretes corticotropin-releasing hormone (CRH) in response to innervation by NE from the locus ceruleus (Ziegler, Cass, & Herman, 1999). This CRH stimulates the anterior pituitary to release adrenocorticotropic hormone (ACTH; Livesey, et al., 2000). ACTH, in turn, stimulates the adrenal cortex to produce cortisol (Davies, Keyon, & Fraser, 1985). Most studies have found that urine and blood plasma cortisol levels are decreased during meditation (Walton, et al., 1995; Sudsuang, Chentanez, & Veluvan, 1991; Jevning, Wilson, & Davidson, 1978).

Beta-endorphin (BE) is an endogenous opioid produced primarily by the arcuate nucleus of the medial hypothalamus and distributed to the brain's sub-cortical areas (Yadid, et al., 2000). The arcuate nucleus releases BE in response to the excitatory neurotransmitter glutamate, to which it is extremely sensitive (Kiss, et al., 1997). BE depresses respiration (Campbell, Weinger, & Quinn., 1995), reduces fear (Kalin, Shelton, & Barksdale, 1988), reduces pain (Amano, et al., 1982), and produces sensations of joy and

euphoria (Janal, et al., 1984). Meditation has been found to disrupt diurnal rhythms of BE and ACTH, while not affecting diurnal cortisol rhythms (Infante, et al., 1998).

Types of Meditation and Approaches to their Study

Although there are thousands of specific approaches to meditation, we have typically divided such practices in to two basic categories. The first method might be called "passive meditation" in which the subject simply attempts to clear all thought from their sphere of attention (d'Aquili & Newberg, 1993). This form of meditation is an attempt to reach a subjective state characterized by a sense of no space, no time, and no thought. Further, this state is cognitively experienced as fully integrated and unified such that there is no sense of a self and other. There is a second general—and frequently practiced—form of "active" meditation, where the subject focuses their attention on a particular object, image, phrase, or word. Active meditation is employed in practices such as transcendental meditation and various forms of Tibetan Buddhism. Active meditation is designed to lead to a subjective experience of absorption with the object of focus. Due to space constraints, we present here only an overview of our model for passive meditation. Active meditation, however, should have many similarities in the physiological and neurochemical changes it produces; the steps of the meditative process merely may occur in a slightly different order. One other differentiation among spiritual practices might be related to whether the practice is guided or done volitionally. Guided practices are those in which an individual is following along with a person or tape that tells the person what to do throughout the practice. Volitional practices are those in which the individual uses their own will to initiate and maintain a practice. They decide what to do and when to do it. The four imaging studies of meditation described above speak to this potential difference in that the one study in which practitioners were guided by tape through their meditation demonstrated no increase in frontal lobe activity. The other three studies in which the subject did the meditation using their own volition all demonstrated increased frontal lobe activity.

It should be clear though that the specific characteristics of a given meditation practice including how the practice is performed (i.e. verbal vs visual vs movement) and what is experienced during different states of the

practice will likely have a profound effect on brain function. For any current or future study of meditation, therefore, it is necessary to carefully describe the type of meditation and what people do and experience during the practice. Future, brain imaging studies may even help towards a clearer development of a typology of spiritual states and practices. For now, it is important to ensure that the phenomenological characteristics of the practice at least inform the neuroscientific perspective of the types of changes that might be expected.Possible Neurochemical Correlates of Meditation

As a way of developing an overall framework from which to explore the wide variety of religious and spiritual practices, we will outline our current concept of a neurophysiological model of meditation (d'Aquili & Newberg, 1993; Newberg & d'Aquili, 2001). In particular, we are attempting to describe the type of meditation practiced by the Tibetan Buddhist subjects in our SPECT study.

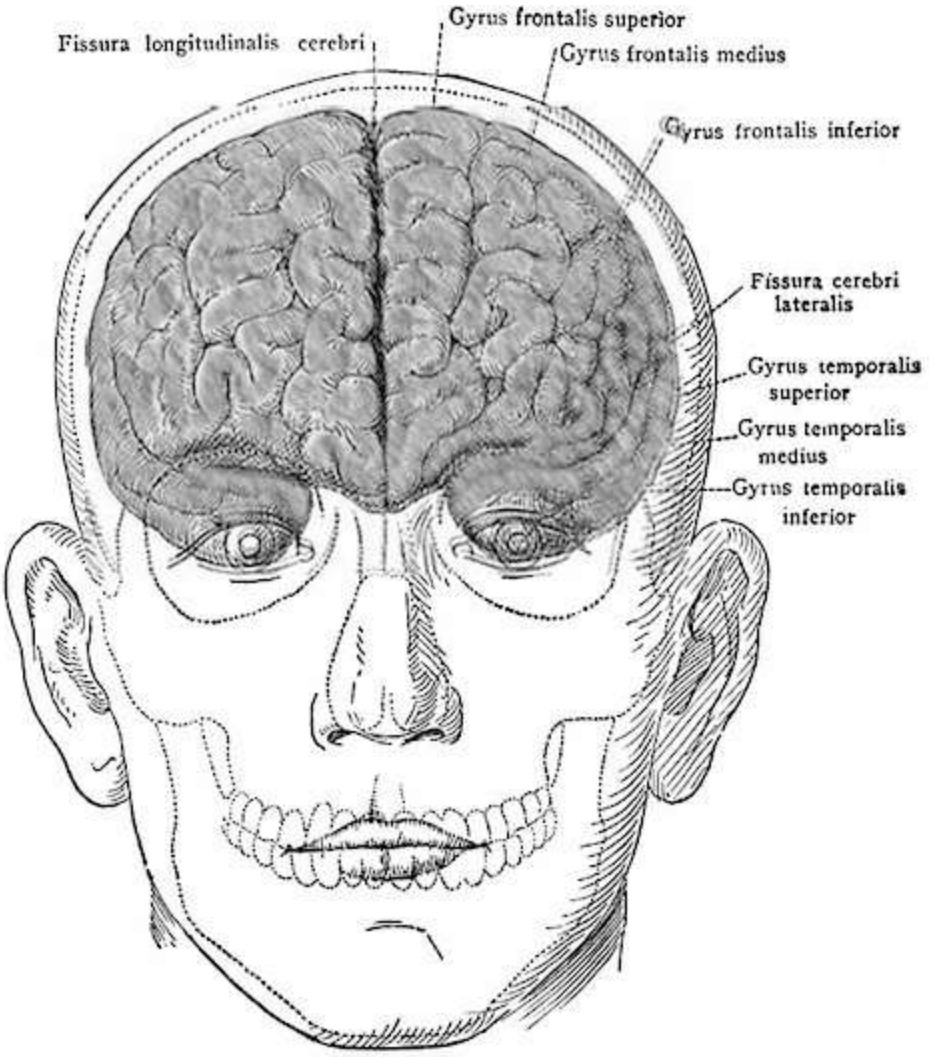
This is only meant to provide a basic understanding of underlying brain mechanisms that will have some similarities and some differences depending on the particular practices and experiences people may have.

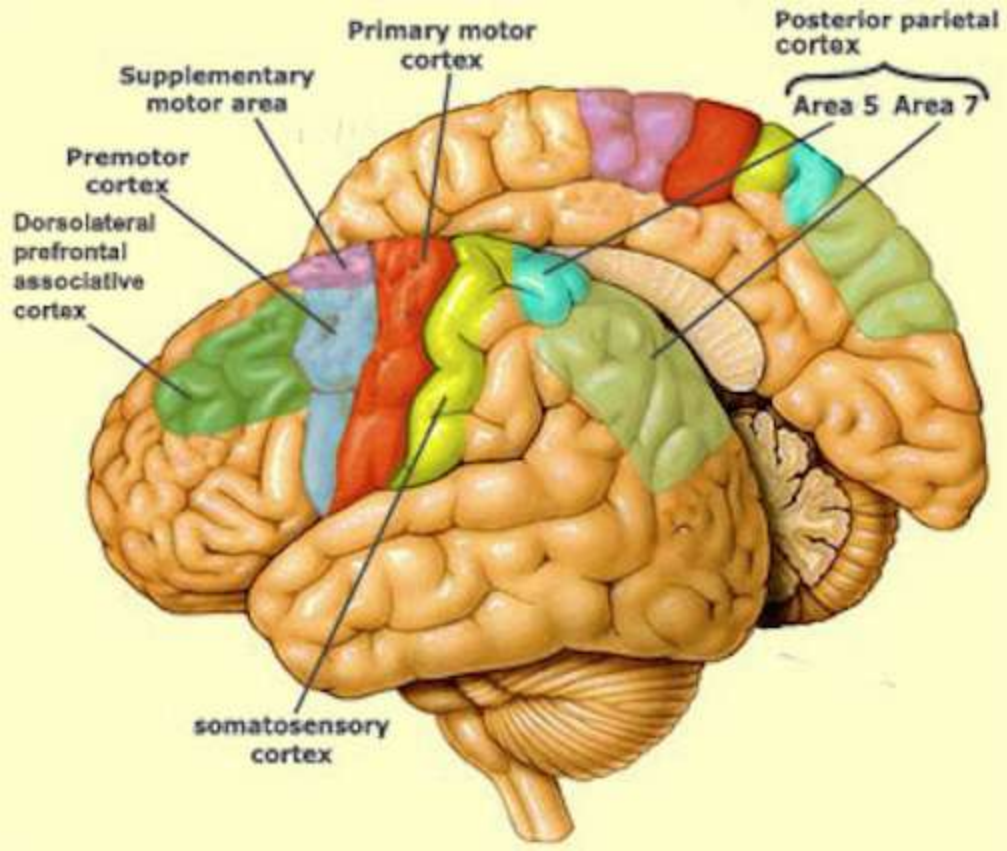
Activation of the Prefrontal Cortex and Cingulate Gyrus

The prefrontal cortex is the only area that receives afferent fibers from all sensory modes, including olfaction, as well as from the multimodal association areas (Stuss, 1986;). The prefrontal cortex is involved in mediating concepts via its rich interconnections with the inferior parietal lobe (Luria, 1980; Stuss, 1986). The prefrontal cortex mediates images and complicated imaginal patterns via its connection with the rostral temporal cortex (Fuster, 1989; Stuss, 1986). The prefrontal cortex of each hemisphere is also connected to the prefrontal cortex of the other by fibers running across the genu and rostrum of the corpus callosum (Stuss, 1986). These may be important in establishing a connected circuit between the two hemispheres during spiritual practices.

Brain imaging studies suggest that willful acts are initiated via activity in the prefrontal cortex along with the anterior cingulate gyrus and are mediated by the excitatory neurotransmitter glutamate (Ingvar, 1994). Since the prefrontal cortex (PFC) in particular appears to mediate intense concentration, it should be essential for almost all meditative practices. Using PET imaging, investigators have shown that when subjects performed

purposely willed tasks or tasks that required sustained attention, there was activation of the PFC (Pardo, Fox, & Raichle, 1991; Frith, et al., 1991). Activation of the PFC and cingulate gyrus has been further validated by the increased activity observed in this region on several of the brain imaging studies of meditation (Herzog, et al., 1990-1991; Newberg, et al., 2001; Lazar, et al., 2000). Therefore, meditation appears to start with activating the prefrontal cortex, and possibly the cingulate gyrus, associated with the will or intent to clear the mind of thoughts.


Fissura longitudinalis cerebri
Gyrus frontalis superior
Gyrus frontalis medius
Gyrus frontalis inferior
Fissura cerebri lateralis
Gyrus temporalis superior
Gyrus temporalis medius
Gyrus temporalis inferior

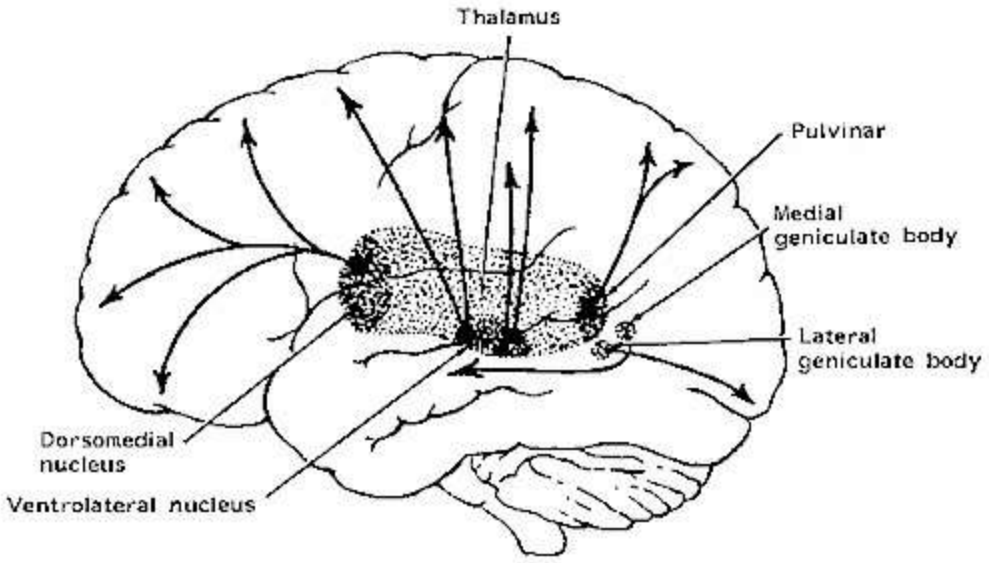


Thalamic Activation

The thalamus governs the flow of sensory and other neuronal information to cortical processing areas via the inhibitory effects of the neurotransmitter GABA on structures such as the lateral geniculate and lateral posterior nuclei. The lateral geniculate nucleus receives raw visual data from the optic tract and routes it to the striate cortex for processing (Andrews, Halpern, & Purves, 1997). The lateral posterior nucleus of the thalamus provides the posterior superior parietal lobule (PSPL) with the sensory information it needs to determine the body's spatial orientation (Bucci, Conley, & Gallagher, 1999). During meditation, if the activation of the right PFC causes increased activity in the reticular nucleus, the result may be decreased sensory input entering into the PSPL and visual center. While brain imaging studies of meditation have not had the resolution to distinguish the reticular nuclei, our recent SPECT study did demonstrate a general increase in thalamic activity that was proportional to the activity levels in the PFC (Newberg, et al., 2001). While it seems likely that the thalamus may play a

critical role in meditation and other types of spiritual practices, further studies will be necessary to clarify the role of the thalamus in meditative practices.

It should also be noted that the dopaminergic system, via the basal ganglia, is believed to participate in regulating the glutamatergic system and the interactions between the prefrontal cortex and subcortical structures. A recent PET study utilizing 11C-Raclopride to measure dopaminergic tone during Yoga Nidra meditation demonstrated a significant increase in dopamine levels during the meditation practice (Kjaer, Bertelsen, Piccini, Brooks, Alving, & Lou, 2002). They hypothesized that this increase may be associated with the gating of cortical-subcortical interactions that leads to an overall decrease in readiness for action that is associated with this particular type of meditation. Future studies will be necessary to elaborate on the role of dopamine during meditative practices as well as the interactions between dopamine and other neurotransmitter systems.



One potentially fascinating point about the thalamus and its relationship to spiritual practices is that our SPECT study demonstrated a baseline asymmetry in the thalamus of long time meditators as compared to non-meditating controls. This asymmetry is especially intriguing since there was significant activation in the thalamus during the meditation practice. The larger question that remains to be answered is whether the baseline difference in the thalamus in meditators is the result of many years of meditation, or is a predisposing factor that makes meditation a very powerful practice for these

individuals. An answer either way would have profound implications for how we understand spiritual practices. If the former were true and meditation can actually affect the brain's basic functioning on a day-to-day basis, then meditation could be a very powerful technique for both spiritual and psychological purposes. It also may support the notion that as a person gets closer to the peak experiences of their tradition, their brain actually adapts and changes to help move the person towards a different state of being. If, on the other hand, some individuals have a predisposition to responding to meditation, this also may have profound theological implications since it might imply that some people have an easier time being spiritual. Such a notion may also have implications for free will and what paths toward religion/spirituality a person may be prone to move along.

PSPL Deafferentation

The PSPL (Brodmann's area 7) is heavily involved in the analysis and integration of higherorder visual, auditory, and somaesthetic information. Through the reception of auditory and visual input from the thalamus, the PSPL is able to generate a three-dimensional image of the body in space and may actually be crucial in distinguishing self from other. There is some difference in function between the P.S.P.L. on the right and the P.S.P.L. on the left. Joseph (1990) originally observed that the right parietal lobe appears to play an important role in generalized localization and the sense of spatial coordinates per se, whereas the left P.S.P.L. exerts influences in regard to objects that may be directly grasped and manipulated. That some neurons in the left P.S.P.L. respond most to stimuli within grasping distance, and other neurons respond most to stimuli just beyond arms reach led Joseph (1996) to postulate that the distinction between self and world may ultimately arise from the left P.S.P.L.'s ability to judge these two categories of distances. Thus, it seems probable that the selfother dichotomy is a left P.S.P.L. function that evolved from its more primitive division of space into the graspable and the non-graspable.

A recent study has suggested that the superior temporal lobe may play a more important role in body spatial representation, although this has not been confirmed by other reports (Karnath, 2001). However, it remains to be seen what is the actual relationship between the parietal and temporal lobes in terms of spatial representation. Regardless, deafferentation of these orienting

areas of the brain, we propose, is an important concept in the physiology of meditation. If, for example, deafferentation of the PSPL by the reticular nucleus's effect on the posterior thalamic nucleus occurs to a significant degree, the person may begin to lose their usual ability to spatially define the self and help to orient that self. Deaffentation of the PSPL has been corroborated by several functional imaging studies of meditation that have demonstrated decreased activity in this area during intense meditation.

We might also hypothesize a distinct experience associated with either right or left PSPL deafferentation. As noted earlier, the right P.S.P.L. is concerned with generating a sense of space and spatial coordinates based upon somaesthetic, visual, and to some extent auditory stimuli. The total deafferentation of the P.S.P.L. cannot result in unusual or unmodulated visions, sounds, or tactile sensations since it has no memory banks with previously stored sensations. Rather, its total deafferentation can only result in an absolute subjective sensation of pure space. But space has no conventional meaning except as a matrix in which to relate objects. We propose, therefore, that pure space arising from total deafferentation of the right P.S.P.L. is subjectively experienced as absolute unity or wholeness.

At the same instant that the right P.S.P.L. is totally deafferented, the left P.S.P.L. is likewise totally deafferented. If the left P.S.P.L. is intimately involved with the maintenance of the Self-Other or the Self-World dichotomy. We propose that the total deafferentation of the left P.S.P.L. results in the obliteration of the Self-Other dichotomy at precisely the same moment that the deafferentation of the right P.S.P.L. generates a sense of absolute transcendent wholeness. Interesting, our SPECT study demonstrated a greater decrease in the left PSPL in the Tibetan Buddhists who were more likely to describe a sense of absorption (i.e. loss of sense of self) during their meditation rather than an experience of spacelessness. Future studies may help to clarify the role of both the left and right PSPL in various elements of spiritual experiences.

Limbic Activation

The hippocampus acts to modulate and moderate cortical arousal and responsiveness, via rich and extensive interconnections with the prefrontal cortex, other neocortical areas, the amygdala, and the hypothalamus (Joseph 1996). Hippocampal stimulation has been shown to diminish cortical

responsiveness and arousal; however, if cortical arousal is initially at a low level, then hippocampal stimulation tends to augment cortical activity (Redding, 1967). Thus, the hippocampus functions in conjunction with the thalamus, hypothalamus, and septal nuclei to prevent extremes of arousal, thereby maintaining a state of quiet alertness (Joseph, 1996, 2001).

The hippocampus greatly influences the amygdala, such that they complement and interact in the generation of attention, emotion, and certain types of imagery (Joseph, 1996, 2014). It seems that much of the prefrontal modulation of emotion is via the hippocampus and its connections with the amygdala (Poletti & Sujatanond, 1980). Because of this reciprocal interaction between the amygdala and hippocampus, the activation of the right hippocampus likely stimulates the right lateral amygdala as well.

That the limbic system is significantly involved in religious experience has also been elaborated upon in an article by Saver and Rabin (1997) in which they consider a wide variety of experiences and hypotheses. After reviewing literature on experiences associated with various pathological conditions such as temporal lobe epilepsy, drug induced states, and schizophrenia, these authors suggest that the limbic areas, particularly the amygdala help to identify certain experiences as profound or real. This limbic function eventually is responsible for assessing which experiences represent a more fundamental level of reality associated with what the experiencer considers the "spiritual realm".

Another piece of evidence of the relationship of the limbic system to spiritual experiences is the research by Persinger in which stimulation of the temporal lobes has been demonstrated to result in the eliciting of a number of components of spiritual experiences including a sensed presence, certain visual experiences associated with spiritual practices, and a loss of the boundary between self and world (Cook& Persinger 1997; Persinger, 2001). Earlier brain stimulation studies in the 1950s and 1960s by Penrose (1954) and other investigators (Weingarten, Charlow, & Holmgren, 1968; Horowitz, Adams, & Rutkin, 1968) also demonstrated that stimulation of certain parts of the temporal lobe could elicit similar types of experiences observed in Persinger's work and those described in association with more "naturally" occurring experiences.

Parasympathetic Activation and Resulting Effects

Stimulation of the right amygdala can cause a stimulation of the ventromedial portion of the hypothalamus with a subsequent activation of the peripheral parasympathetic system (Joseph, 1996, 2014). This activation may result in the subjective sensation first of relaxation, and eventually, of a more profound quiescence. Activation of the parasympathetic system would cause a reduction in heart rate and respiratory rate, changes that have been extensively reported in the literature on meditative practices. This "involuntary" decrease combined with the voluntary attempt of the meditator to steady and slow breathing and movement should be associated with increased parasympathetic tone and decreased sympathetic tone. The mechanism by which sympathetic tone is decreased may involve the locus ceruleus, which produces and distributes norepinephrine (NE), the principle neurotransmitter of the sympathetic nervous system. The locus ceruleus receives most of its excitatory input from the medulla's lateral paragigantocellular nucleus, which monitors breathing and heart rate (Van Bockstaele & Aston-Jones, 1995).

During a meditative practice, decreased heart rate and breathing associated with parasympathetic activation, then, should theoretically reduce the firing of the paragigantocellular nucleus of the medulla and cut back its innervation of the locus ceruleus, which densely and specifically supplies the PSPL and the lateral posterior nucleus with NE (Foote, 1987). Less innervation would therefore mean a decrease in the quantity of NE delivered to these regions, where it normally serves to increase their susceptibility to sensory input by amplifying strong stimuli and gating out "noise" that falls below the activation threshold (Waterhouse, Moises, & Woodward, 1998). Thus, a reduction in NE decreases the impact of sensory input on the PSPL, contributing to its deafferentation. It turns out that a few studies have demonstrated an overall decrease in NE levels in the body which may in turn be related to the decreased central NE levels.

The increased parasympathetic activity should also result in the hypothalamic paraventricular nucleus, decreasing its production of CRH, ultimately lowering the adrenal cortex's production of cortisol, a finding observed in the majority of meditation studies. The drop in blood pressure associated with meditation should induce the hypothalamic supraoptic nucleus to release the vasoconstrictor AVP (Renaud, 1996), which has been shown to increase dramatically during meditation.

Positive-Feedback Circuit Formation

As the meditation practice continues, there should theoretically be increasing activity in the PFC associated with the ever persistent will to focus attention. Most of the neurons of the PFC are glutamatergic, meaning that they produce and employ the excitatory neurotransmitter glutamate to communicate among themselves and to innervate other brain structures (Cheramy, Romo, & Glowinski, 1987). In general, as PFC activity increases, it produces ever-increasing levels of free synaptic glutamate in the brain. This glutamate can stimulate the hypothalamic arcuate nucleus to release BE, depressing respiration, reducing fear and pain, and producing sensations of joy and euphoria, feelings that have been described during meditation. However, it is unlikely that BE is the sole mediator in such experiences because simply taking morphine-related substances does not produce equivalent experiences and one very limited study demonstrated that blocking the opiate receptors with naloxone did not affect the experience or EEG pattern associated with meditation (Sim & Tsoi, 1992).

Glutamate activates NMDA receptors (NMDAr), but excess glutamate can kill these neurons through excitotoxic processes (Albin & Greenmyre, 1992). We propose that, as glutamate levels approach excitotoxic concentrations, the brain might limit its production of N-acetylated-alpha-linked-acidic dipeptidase (NAALADase), which converts the the production of glutamate from its precursor N-acetyl-aspartyl-glutamate (NAAG; Thomas, et al., 2000). Interestingly, NAAG is functionally analogous to the disassociative hallucinogens ketamine, phencyclidine (PCP), and nitrous oxide. These

NMDAr antagonists produce a variety of states that may be characterized as either schizophrenomimetic or mystical, such as out-of-body and near-death experiences (Ellison, 1995; Jansen, 1995).

Complex Autonomic Activity

This is a complicated aspect of our current model of meditative states primarily because of the difficulty in assessing overall autonomic tone during a particular state. This is difficult because of the reciprocal changes that occur when one arm of the autonomic nervous system is activated or inactivated. For example, the observation of a decrease in heart rate may signal increased

parasympathetic activity or decreased sympathetic activity, or a combination of these. It should be noted that autonomic activity has been observed to change during meditation and that these changes may differ depending on the specific practice and state during that practice that a measurement is obtained.

Gellhorn and Kiely (1973) developed a model of meditation based almost exclusively on autonomic activity. While this notion may be somewhat limited, it nevertheless demonstrated the importance of the autonomic nervous system during such experiences. These authors suggested that intense stimulation of either the sympathetic or parasympathetic system, if continued, could ultimately result in simultaneous discharge of both systems (Gellhorn and Kiely 1973). It was postulated by Gellhorn and Kiely (1972) that the reversal state and the state of maximal discharge of both the sympathetic and parasympathetic systems are associated with physiological states such as sexual orgasm or prolonged stress, learned behaviors such as meditation or ecstatic states, and pathological states such as psychoses. More recent studies have demonstrated changes in heart rate and galvanic skin response during meditation and have generally shown predominantly parasympathetic activity as demonstrated by decreased heart rate and blood pressure, decreased respiratory rate, and decreased oxygen metabolism (Sudsuang, Chentanez, & Veluvan, 1991; Jevning, Wallace, & Beidebach, 1992).

Our original model was based, to some extent on the work of Gellhorn and Kiely (1972) who suggested that intense stimulation of either the sympathetic or parasympathetic system, if continued, could ultimately result in simultaneous discharge of both systems. A recent study corroborated the notion of mutual activation of parasympathetic and sympathetic systems by demonstrating an increase in the variability of heart rate during meditation (Peng, et al., 1999). The increased variation in heart rate was hypothesized to reflect activation of both arms of the autonomic nervous system. This notion also fits the description people have of these experiences in that they feel both a sense of overwhelming calmness as well as significant alertness.

It is interesting to note that stimulation of both systems can result in intense stimulation of structures in the lateral hypothalamus and median forebrain bundle which are known to produce both ecstatic and blissful feelings when stimulated (Olds & Forbes, 1981). Activation of the lateral hypothalamus has also been demonstrated to stimulate the dorsal raphe to

deliver more ST to the temporal lobe visual association areas. When ST is produced by the dorsal raphe, it also inhibits the lateral geniculate nucleus, greatly reducing the amount of visual information that can pass through (Funke & Eysel, 1995). Combined with reticular and ST inhibition of the lateral geniculate nucleus of the thalamus, ST would increase the fluidity of temporal visual association in the absence of sensory input. The result would likely be the generation of internally derived imagery which has also been described during certain meditative states. Greatly increased ST levels might also provoke hallucinations in the manner of the tryptamine psychedelics which are known to affect the ST system, particularly in the temporal lobes.

Increased ST levels, combined with lateral hypothalamic innervation, may lead the pineal gland to increase MT production that has been shown to decrease pain sensitivity and produce a sensation of tranquility. Such experiences are described during meditation, and an increase in MT has also been observed. Under circumstances of heightened activation, pineal enzymes can also endogenously synthesize the powerful hallucinogen 5-methoxy-dimethyltryptamine (DMT; Guchhait, 1976).

Strassman has extensively linked DMT to a variety of mystical states, including out-of-body experiences, distortion of time and space, and interaction with supernatural entities (Strassman, 2001).

Future Directions in the Study of Meditative and Spiritual Phenomena

The future neuropsychological study of meditative practices, other religious experiences, and even experiences of distant intentionality, may offer a number of fascinating possibilities. The focus of initial studies will need to be on the specific neuroscientific techniques that will be most useful in the study of such phenomena. Imaging techniques, including PET, SPECT, and MRI, can be evaluated for their capacity to study the neurobiological correlates of meditative practices and spiritual phenomena. Specifically, such neurobiological correlates as cerebral metabolism, blood flow, and neurotransmitter receptor levels can be analyzed. Logistical issues and problems of the various techniques need to be considered in order to assess which techniques may offer the most appropriate methodology for the study of such experiences. Care should be taken so that confounding variables can be minimized and the possibility of identifying an effect is maximized. Experimental interventions should be simple, well defined, and distinct from

other types of interventions to exclude possible extraneous effects. Interventions that use only one form of activity such as meditation or prayer might be the most appropriate. Interventions requiring a combination of techniques (i.e. combining praying, dancing, and singing) might be too complicated for studying individual components of the intervention and may complicate careful analysis of the effects. Thus, interventions that allow for the simplified study of specific aspects of spiritual experience will have the highest yield in initial experiments. Homogeneity of spiritual interventions also will improve the results obtained from small, preliminary studies. Other variables such as electroencephalography, autonomic activity, and neuroendocrine and immunological markers may also help elucidate the overall interaction between the brain and the body during such states.

We cannot conclude without returning the "neuro" back to "neurotheology." While theoretical models and empirical research may contribute to our understanding of spiritual practices and experiences, as well as advance our understanding of how the human brain functions, we cannot ignore some of the larger questions regarding the meaning of such analyses for theological and religious principles (d'Aquili & Newberg, 1999). Principles associated with the standard doctrine of specific religions, the more "mundane" religious experiences that most people are used to having in association with worship or liturgical rituals, and theological notions about love, forgiveness, and even the relationship of human beings to God, may all be influenced by brain function. Studying some of the more intense spiritual experiences from a neuropsychological perspective may provide important information about such experiences, but also hopefully provides a framework from which the vast array of religious and spiritual thoughts, feelings, and practices may be approached. We must also be aware of what spiritual and theological perspectives may have to say about scientific methods and ultimately about epistemological and ontological questions that have plagued human beings throughout history. It is from this intersection of neuroscience and theology that the field of neurotheology can emerge – as long as it strives to incorporate the best ideas from both the scientific and the spiritual perspectives.

20. The Neuropsychology Of Spirituality And Religious Feelings

by Scott Atran
Centre National de la Recherche Scientifique, Paris, The University of Michigan, Ann
Arbor, Michigan.

Religion's Evolutionary Landscape: Cognition and Commitment.

Let us consider religion to be a community's (1) costly and hard-to-fake commitment (2) to a counterfactual world of supernatural agents (3) and which enables people to master their existential anxieties, such as death and deception (Atran 2002). The present chapter mainly concerns the third criterion of religion (3), and its implications for neuropsychology. This introductory section, however, first summarizes the overall intellectual framework.

The criterion (1) of costly commitment rules out cognitive theories of religion as sufficient, however insightful. Such theories lack motive (Atran & Sperber 1991, Boyer 1994, Barrett 2000). In principle, they can't distinguish nonreligious fantasy from religious belief. They fail to tell us why, in general, the greater the sacrifice to the apparently absurd – as in Abraham's willingness to offer up his beloved son the more others trust in one's commitment (Kierkegaard 1955[1843], Weber 1946).

The criterion (2) of belief in the supernatural rules out commitment theories of religion as sufficient, however insightful. Such theories disregard cognitive structure and its causal role (Irons 1996, Nesse 1999, Wilson 2002). They don't distinguish strong secular ideologies, such as orthodox belief in Marxism or the Market, from religious belief.

Religions often invoke supernatural agents to deal with (3) emotionally eruptive existential anxieties, such as death and deception (Feuerbach 1972[1843], Freud 1990[1913]) They generally have malevolent and predatory deities as well as more benevolent and protective ones. Supernatural agent concepts trigger our naturally-selected agency-detection system, which is trip-wired to respond to fragmentary information, inciting perception of figures lurking in shadows, and emotions of dread or awe (Guthrie 1993; cf. Hume 1956[1757]). To be sure, nondeistic "theologies", such as Buddhism and Taoism, doctrinally eschew the supernatural. Nevertheless, common folk who espouse these faiths routinely entertain belief in an array of gods and spirits. Even Buddhist monks ritually ward off malevolent deities by invoking benevolent ones. Sometime during the Pleistocene hominids became their own worst predators, encouraging natural selection of an ability to rapidly detect and react to supremely intelligent and rapacious agents (Alexander 1987). Mistaking a non-agent for an agent would do little harm, but failing to detect an agent especially a human or animal predator could well prove fatal. From an evolutionary perspective, it's better to be safe than sorry. This cognitive proclivity would favor the emergence of malevolent deities in every human culture, just as the countervailing Darwinian imperative to attach to protective caregivers would cognitively favor the apparition of benevolent deities.

Indeed, many mammals, such as social carnivores and primates, evince behaviors consistent with an integrated appreciation of evolved predator-protector-prey schema. In "chase play" the young typically "dare" a protector

(parent, sibling) to chase them as a predator would, only to "surrender" to the pettings, lickings and other comforting behaviors of the chaser. Only humans, however, appear to have evolved a fully developed agency-awareness module, or "folkpsychology," capable of representing alternative worlds and states of mind (Baron-Cohen 1995, Suddendorf 1999). This capacity to model different models of things is necessary to the conception of counterfactual worlds, including the supernatural.

Such "meta-modeling" or "meta-representational" ability has wide-ranging consequences for human survival. It allows people to conceive of alternative worlds and to entertain, recognize and evaluate the differences between true and false beliefs. Given the ever-present menace of enemies within and without, concealment, deception and the ability to both generate and recognize false beliefs in others would favor survival.

Supernatural causes and beings are generally meta-represented as more or less vague ideas about other ideas, like a metaphor that meta-represents the earth as a mother but not quite, or an angel as a winged youth but not quite. The supernatural cannot be simply represented as a proposition about a state of affairs whose truth, falsity or probability can be factually or logically evaluated. No statement or thought about the supernatural can be empirically disconfirmed or logically disproven.

Because human representations of agency and intention include representations of false belief and deception, human society is forever under threat of moral defection. By invoking omniscient and omnipotent supernatural agents who have only (or almost only) true beliefs, people steadfastly commit to one another in a moral order that goes beyond apparent reason and self-conscious interest. In the competition for moral allegiance, secular ideologies are at a disadvantage. For, if people learn that all apparent commitment is self-interested convenience or worse, manipulation for the self interest of others, then their commitment is debased and withers. Especially in times of vulnerability and stress, social deception and defection in the pursuit of self preservation is therefore more likely to occur (Ibn Khaldun 1958[1318]:II,iii:41). Religion passionately rouses hearts and minds to break out of this viciously rational cycle of self-interest, and to adopt group interests that may benefit individuals in the long run. More generally, religious commitment to the supernatural underpins the "organic solidarity" (Durkheim 1995[1912]) that makes social life more than simply a contract

among calculating individuals. It creates the arational conditions for devotion and sacrifice that enable people and societies to endure even against terrible odds. A supernatural agent can ultimately punish cheaters, defectors and free riders, no matter how devious or careful they may be.

Purely ideological commitments to moral principles also lack interactive aspects of personal agency – and the emotional intimacy that goes with it – as well the promise to allay the eruptive and uncontrollable existential anxieties for which there appears to be no rational expectation of resolution, such as vulnerability (to injustice, pain, dominance), loneliness (abandonment, unrequited love), and calamity (disease, death). Evolutionarily, at least some basic emotions preceded conceptual reasoning: surprise, fear, anger, disgust, joy, sadness (Darwin 1965[1872], Ekman 1992). These may have further evolved to incite reason to make inferences about situations relevant to survival decisions. This was plausibly an important selection factor for the emergence of reason itself. Existential anxieties are by-products of evolved emotions, such as fear and the will to stay alive, and of evolved cognitive capacities, such as episodic memory and the ability to track the self and others over time. For example, because humans are able to meta-represent their own selves and mentally travel in time (Wheeler et al. 1997), they cannot avoid overwhelming inductive evidence predicting their own death and that of persons to whom they are emotionally tied, such as relatives, friends and leaders. Emotions compel such inductions and make them salient and terrifying. This is "The Tragedy of Cognition." Religions customarily propose a supernatural resolution in some minimally counterfactual afterlife.

In religion, as in love and strife, sanctified displays of passionate commitment to others are given in the face of existential anxieties for which no predictable outcome or rational solution is possible, as at marriages, send offs and funerals. These sacred vows are promises to help one another in future situations where there is need, and no hope of reward. This enables people to trust and do uncalculating good for one another. That's the good news. The bad news is that just as a marriage commitment to one person precludes similar to commitment to another, so a religious commitment to one society or moral order usually precludes commitment to another. Not that all religions explicitly insist on mutually exclusive commitments, though many do. Rather, every religion professes absolute and nonnegotiable commitments that set the limits of tolerance. This adversarial process leads to

unending development of new religious and cultural forms. Thus, despite the rise of secular ideologies and science, and corresponding predictions of religion's inevitable demise, new religious movements (NRMs) continue to arise at a furious pace perhaps at the rate of two or three per day (Lester 2002).

Communal rituals rhythmically coordinate emotional validation of, and commitment to, moral truths in worlds governed by supernatural agents (Turner 1969, Rappaport 1999). Rituals involve sequential, socially interactive movement and gesture and formulaic utterances that synchronize affective states among group members in displays of cooperative commitment. Religious rituals habitually include displays of social hierarchy and submission typical of primates and other social mammals (outstretched limbs baring throat and chest or genitals, genuflection, bowing, prostration, etc.). Even priests and kings must convincingly show sincere obeisance to higher supernatural authority lest their own authority be doubted (Burkert 1996; cf. Watanabee & Smuts 1999).

Religious ritual also involves more primitive communicative forms that Tinbergen calls "ritualized social releasers" (1951:191-192). Social releasers exhibit sense-evident properties, "either of shape, or colour, or special movements, or sound, or scents," which readily elicit a well-timed and well-oriented cooperative response in a conspecific: for mating, parenting, fighting, defense, food gathering, and the like. But humans, it appears, are the only animals that spontaneously engage in creative, rhythmic bodily coordination to enhance cooperation. Unlike, say, avian mating calls or flight formations, human music or body dance (which are omnipresent in worship) can be arbitrarily and creatively elicited, transferred, combined, or interpolated to fit many different purposes and contexts (e.g., from use of love songs in mating displays to use of mating displays in sales jingles).

A key feature of the creativity of human worship is use of music in social ritual. Even the Taliban, who prohibited nearly all public displays of sensory stimulation, promoted a cappella religious chants. In a survey of persons who reported a religious experience (Greeley 1975), music emerges as the single most important elicitor of the experience (49% of cases), followed by prayer (48%) and attending group services (41%). Reading the Bible (31 %) and being alone in church (30 %) trail significantly behind. Listeners as young as three years old reliably associate basic or primary emotions to musical

structures, such as happiness, sadness, fear and anger (Trainor & Trehub 1992; cf. Cunningham & Sterling 1988, Panksepp 1995). Electrocortical measures of frontal brain activity suggest that people exhibit greater relative left frontal activity to joyful and happy music and greater relative right frontal activity to to fearful and sad music, with activity greater for fearful than sad reactions and for joyful than happy reactions (Schmidt & Trainor 2001).

Music invites interpersonal relationships, creating emotional bonds between people, through the "attunement" of somatic states – much as the rocking and cooing behavior of mother and infant attunes the parental bond (Stern 1985). This is especially apparent in "call-response" format, as in Yoruba dances and Hebrew services. Moreover, in religious contexts, music is frequently experienced as authorless, like the sacred texts that often accompany it. The pre-tonal religious music of small-scale societies usually has its mythic beginnings in the origins of the world, which invites audiences to share in a sense of timeless intimacy. For the Catholic Church, Gregorian chants were taught to men by birds sent from heaven. Even Bach, Mozart and Beethoven were but vehicles of The Divine.

In sum, religion is not an evolutionary adaptation per se, but a constantly re-emerging cultural path by which people readily navigate the complex evolutionary landscape that sets cognitive, emotional and material conditions for ordinary human interactions. It arises, in part, from developed cognitions of folk psychology and agency. This involves meta-representation, which makes deception possible and threatens any social order; however, these same meta-cognitive capacities provide the hope and promise of open-ended solutions through representations of counterfactual supernatural worlds that cannot be logically or empirically verified or falsified. Core religious beliefs minimally violate ordinary notions about how the world is, with all of its inescapable problems, thus enabling people to imagine minimally impossible worlds that appear to solve existential problems, including death and deception (Norenzayan & Atran 2002). Because religious beliefs and experiences cannot be deductively or inductively validated, validation occurs only by assuaging the very emotions that motivate religion. Through movement, sound, smell, touch and sight, religious rituals affectively coordinate actors' minds and bodies into convergent expressions of public sentiment – a sort of N-person bonding that communicates moral consensus.

Existential Motivation: Deception and Death

In this section, I summarize competing arguments and recent experiments with colleagues relating to the claim that religion crucially involves supernatural agents who address existential anxieties, such as deception and death.

One idea common to psychoanalysis (Freud 1990[1913], Erikson 1963) and attachment theory (Bowlby 1969, Kirkpatrick 1998) is that deities are surrogate parents that assuage existential anxieties. One reason for rejecting or substantially modifying this idea as it stands comes from anthropology. Ethnographic reports indicate that malevolent and predatory deities are as culturally widespread, historically ancient and as socially supreme as benevolent deities. Examples include the cannibalistic spirits of small-scale Amazonian, sub-Saharan African and Australian aboriginal societies as well as the bloodthirsty deities of larger-scale civilizations that practiced human sacrifice, such as Moloch of the Ancient Middle East, the death goddess Kali of the tribal Hindus and the Maya thunder god Chaak. Serpent-like devils and demons seem to be culturally ubiquitous (Munkur 1983), perhaps evoking and addressing a primal fear shared by our primate line (Mineka et al. 1984).

It also appears that neuropsychologist Michael Persinger (1987) sees readiness to believe in God as a psychological compulsion to recover the lost parental security of childhood. This innate reward and punishment. Learning to generalize to God need involve little more than simple word association: "In this way, the properties of objects [e.g., parents] are transferred to words [e.g., "God"]": "The parents no longer have the properties of omnipotence and omnipresence. Through experience, the adult has learned that parents are discrete and mortal beings with limited space and little time. The childhood expectations have been generalized to God" (1987:66).

Details of the God concept are determined by a person's culturally-conditioned experiences. Thus: "Matrilineal societies... have female gods. In patrilineal societies, where the male line is most important, the god is portrayed with clear masculine features."

Although it is vaguely true that the deities of different societies take on culturally-specific aspects of those societies (Durkheim 1995[1912]), there is often no simple mapping or straightforward projection of social structures onto to god features. For example, the matrilineal Nair (Warrior Caste) of Kerala in South India have the same pantheon of 330 male and female deities

as do patrilineal Hindus. Off the Arabian Sea's Kerala coast, the matrilineal Lakshadsweep Islanders have no God but Allah, and worship Mohammed as His Prophet just as the patrilineal Arabs do.

Some of the syncretic Moslem and Christian societies of Asia and Africa have high-ranking women deities, and even important animal and plant deities. A recurrent myth in male-dominated patrilineal societies of Africa, such as the Gola of Liberia (d'Azevedo 1973), is that female deities originate what men desire to control (Horton 1963). For the patrilineal Tsembaga of New Guinea, the most important single spirit is "Smoke Woman" (Kun Kaze Ambra), who "acts as an intermediary between the living and all other categories of spirits." This female deity "might, out of jealousy, do mischief to any woman with whom a [male] novice of hers consorts" (Rappaport 1979:103).

Another reason for doubting that gods are just surrogate parents comes from cognitive psychology, in particular the branch of cognitive psychology known as "theory of mind" or "folkpsychology." Cross-cultural experimental evidence from child development studies indicate that young children reliably distinguish the intentions of parents from those of God and other supernatural agents just as soon as they can attribute intention and belief to anybody or anything at all.

Attributing intention and belief critically involves the child's ability to meta-represent propositions about the world as true or false. This ability emerges around age 4 (Wimmer & Perner 1983, Wellman 1990).

In one of the few studies to replicate findings on "theory of mind" in a small-scale society (cf., Avis & Harris 1991), Knight, Barrett, Atran and Ucan Ek' (2001) showed monolingual Yukatek Maya children a tortilla container and told them, "Usually tortillas are inside this box, but I ate them and put these shorts inside." Then they asked each child in random order what a person, God, the sun (k'in), the principal forest spirits (yumil k'ax'ob, "Masters of the Forest"), and other minor spirits (chiichi') would think was in the box. In line with recent studies of American children (Barrett et al. 2001), the youngest Yukatek children (4 year-olds) overwhelmingly attribute true beliefs to both God and people in equal measure. By age 5, the children attribute mostly false beliefs to people but continue to attribute mostly true beliefs to God (Figure 66).

Children 5 and over attribute true beliefs according to a hierarchy with

God at the top and people at the bottom (Figure 67). Yukatek consider the Masters of the Forest powerful and knowledgeable spirits that punish people who try to overexploit forest species. Yukatek children tend to believe that forest spirits, God and the sun, "live" (kukuxtal) but do not "die" (kukumil). For Maya adults, such beliefs have reliably measurable behavioral consequences for biodiversity, forest sustainability, and so forth (Atran et al. 2002). In brief, from an early age people reliably attribute to supernaturals cognitive properties that are different from parents and other people. Furthermore, people reliably behave differently in accordance with these different attributions.

Children's ability to distinguish god concepts from parent concepts comes about only with the acquisition (innately-driven maturation) of a capacity for meta-representation, that is, part of a fully developed folk psychology. It is logically impossible for such a cognitive capacity, or "theory of mind," to arise from conditioning or trial-and-error learning; that is, a faculty of greater representational power (meta-representation) cannot arise piecemeal by induction or accretion from a faculty of lesser representational power (simple representation or perception of a state of affairs) (Fodor 1974; cf. discussions in Hirschfeld & Gelman 1994). Nevertheless, the idea that deities often co-opt childhood emotions associated with parental prepotency is well taken. Only, this cannot be the whole story. In religion's counterfactual and counterintuitive worlds one and the same deity can even have the dualizing role of predator and protector, or prey and protector. These may well be humankind's most popular deities. It is not an infant-parent or child-kin group template from which god concepts extend, but plausibly a more encompassing evolutionary program for detecting and dealing with agency and intention, both good (inspiring trust) and bad (inspiring fear).

Another experiment that ties religion to belief in the supernatural's ability to deal with human existential anxieties was recently carried out by Ara Norenzayan, Ian Hansen and myself. In particular, this experiment links adrenaline-activating death scenes to increased belief in God's existence and the efficacy of supernatural intervention in human affairs. Results show that people cognitively commit themselves more to the supernatural under stressful interpretations of events involving other people than they do when events are emotionally uneventful. This is so even when those uneventful events specifically involve a religious component. Commitment theories of

religion also neglect such special effects of the supernatural.

Our experiment was built on a study by Larry Cahill and colleagues (1994) in the laboratory of James McGaugh. They showed college students a series of slides and a storyline about a boy riding a bike. Some subjects were exposed to an uneventful story: the boy rides his bike home, and he and his mother drive to the hospital to pick up his father (who is a doctor). For the other participants, the story begins and ends in much the same way, but the middle is very different: the boy is hit by a car and rushed to the hospital's emergency room, where a brain scan shows severe bleeding from the boy's brain and specialized surgeons struggle to reattach the boy's severed feet. After exposure to the stories, and before being tested for recall, half the subjects were given either a placebo pill or a drug (propranolol) that blocks the effects of adrenaline. The placebo and drug groups recalled the uneventful story equally well. Only the placebo group, however, remembered the emotional story more accurately than the uneventful one. (Similar effects occur from amygdala damage, McGaugh et al. 1995).

Our hypothesis was that stressful events associated with existential anxieties (e.g., death) not only deeply affect how people remember events but also religious coloring of those events. We first controlled for religious background and measured for religious identification. Then we primed each of three groups of college students with a different story: Cahill et al.'s uneventful story (neutral prime), Cahill et al.'s stressful story (death prime), and another uneventful story whose event-structure matched the other two stories but which included a prayer scene (religious prime). After this, each group of subjects read a reprint from a New York Times article (2 Oct. 2001) whose lead ran: "Researchers at Columbia University, expressing surprise at their own findings, are reporting that women at an in vitro fertilization clinic in Korea had a higher pregnancy rate when, unknown to the patients, total strangers were asked to pray for their success." The article was given to students under the guise of a different story about "media portrayals of scientific studies." Finally, the students rated the strength of their belief in God and the power of supernatural intervention on a nine-point scale.

Results show that strength of belief in God's existence (Figure 68) and in the efficacy of supernatural intervention (Figure 69) are reliably stronger after exposure to the death prime than either to the neutral or religious prime (there were no significant differences between either uneventful story). This was so

whatever students' religious background or prior degree of religious identification. In sum, emotional stress associated with death-related scenes seems a stronger natural motivator for religiosity than mere exposure to emotionally unstressful religious scenes, such as praying.

This provides some confirmation of the claim that emotionally eruptive existential anxieties motivate belief in the supernatural. We also plan to test the further claim that invocation of the supernatural not only cognitively validates these eruptive emotions, but is affectively validated by assuaging the very emotions that motivate belief in the supernatural. With this in mind, it is worth noting that uncontrollable arousal mediated by adrenergic activation (as for subjects exposed to death scenes) may lead to posttraumatic stress disorder (PTSD) if there is no lessening of terror and arousal within hours; however, adrenergic blockers (propranolol, clondine, guanfacine, and possibly antidepressants) can "interrupt the neuronal imprinting that leads to long-term symptoms" (McReady 2002:9). A possibility arises, then, that heightened expressions of religiosity following exposure to death scenes that provoke existential anxieties could also serve this blocking function.

Religion and Psychopathology: Possession, Epilepsy, Schizophrenia, Autism.

Stress is a key factor in emotionally drawn out communal rituals, such as initiation rites and exorcisms, and mystical states, like divine visions and revelations. In cases of religious possession, society often draws a fine line between supernaturally-caused possession and organically-caused madness that is often stress related: madman is designated by the word ma_noun; the possessed person is called madroub or 'struck' by a spirit. To chase away the intruding spirit from the possessed body, one turns to a faqir [an indigent wanderer or street person who practices healing and sorcery by virtue of being 'gifted with supernatural power, because of his friendship with Allah']. ... A faqireh [female sorceress] seizes the possessed person, places him in the middle of the room and begins turning around him as she plays the tambourine. At the sound of this primitive music, the spirit stirs restlessly; the afflicted person has convulsions" (Jaussen 1948[1907]:327).

Recurring cases of possession are reported from Africa and Afro-America (Leiris 1958, Douyon 1966, Lewis, 1971, Kilson 1972, Walker 1972, Pressel 1974, Ben-Amos 1994), European America (Freed & Freed 1964), Native

America (Lowie 1924, Reina 1966), China (Yap 1960), India (Crooke 1907, Whitehead 1988[1921]), North Africa and the Middle East (Jaussen 1948[1907]). Cases in the USA often involve possession by devils, witches (Ludwig 1965, Warner 1977) and, more recently, aliens (cf. Blackmore 1999). Variants of possession include "soul kidnapping" (Lowie 1924:177-178) or "soul loss" (Warner 1977) through the agency of malevolent spirits. Black magic and bewitchment, in which spirits cast charms or spells on victims, can also exhibit aspects of possession. This is especially so in regard to the onset of symptoms and debilitating pathology, as with depression and disease (Redfield & Villa Rojas 1934:177-180). If not exorcised, death may be expected.

Although there is no clear psychopathology associated with possession, there is a more or less identifiable family of associated symptoms: listlessness, depression, guilt feelings, fainting and dissociation are frequent. Acute or chronic stress (or emotional or psychic "tension") is habitually cited as precipitating and accompanying non-institutionalized cases of possession. Institutionalized cases tend more to have psychotic pathologies, such as schizophrenic hallucination, epileptic confusion, mania, senility, and so forth. In one institutionalized Chinese sample of possessed patients, Yap (1960) reported mainly hysterics (48.5%), schizophrenics (24.3 %) and depressives (12.2 %).

In many societies, auditory and visual hallucinations that our medical establishment associates with certain forms of temporal-lobe epilepsy and schizophrenia often take on a religious color. They become the "voices" and "visions" of personal revelation for the subjects themselves and, depending upon the society, they may become the charge of local religion as well. To a significant extent, persons prone to schizophrenia may find themselves better suited for a more cloistered religious life (Kelley 1958). In some societies, epileptics may be preferentially chosen as shamans (Eliade 1964). For example, in North India (Crooke 1907:259-260): "The Shaman lives a life apart, practises or pretends to practise various austerities, wears mysterious and symbolical garments, and performs noisy incantations in which a sacred drum or an enchanted rattle takes a leading part. On occasion he should be able to foam at the mouth and go into a trance or fit, during which his soul is supposed to quit his body and wander away into space. By some these seizures have been ascribed to epilepsy."

One prominent neurobiological focus of these extreme religious experiences as well as nonpathological experiences involving glossolalia, trance and meditative ecstatic visions– is the amygdala-hippocampus complex (Beard 1963, Slater & Beard 1963, Bear 1979, Gloor et al. 1982, Geschwind 1983, Joseph, 2001, Persinger 1984). Accounts of visual and auditory hallucinations among some of history's leading religious converts and mystics intimate possible temporal-lobe epilepsy. A particularly controversial case concerns the dramatic conversion of the Apostle Paul.

Paul was a vicious persecutor of Christians. One day, he collapsed on the road to Damascus and suddenly experienced auditory and visual hallucinations. As a result, he converted to Christianity and became perhaps the single most important figure in fostering its spread beyond a few marginal Jewish communities of the Roman Empire. Psychologist William James (1902) surmises that Paul's newfound voice of conscience may have been "a physiological nerve storm or discharching lesion like that of epilepsy," although lack of of evidence for subsequent mental deterioration argues against temporal-lobe epilepsy (Woods 1913). Another famous case concerns a16th-century saint, Teresa of Avila. She experienced vivid visions, intense headaches and fainting spells, followed by "such peace, calm, and good fruits in the soul, and ... a perception of the greatness of God" (St. Theresa 1930:171).

Biographers suggest that she may well have experienced epileptic seizures (Sackville-West 1943), similar perhaps to the fits suffered by the Russian writer and religious mystic, Fyodor Dostoevsky. The absence of details precludes an accurate diagnosis in such cases. Yet, there is little doubt that extreme and even pathological religious experiences have been interpreted over the ages as unequivocal signs of divine enlightenment or possession in different times and places. In contemporary Europe and North America, however, such manifestations more often lead to confinement in a mental asylum (ex-

Beard and colleagues found that 38% of patients had hallucinations and mystical delusions, although fewer than 9% had religious convictions prior to the onset of symptoms (Beard 1963, Slater & Beard 1963). Typical reports of religious experiences among temporal-lobe epileptics include: "greater awareness," "seeing Christ come down from the sky," "seeing Heaven open"; "hears God speak"; "feels himself transfigured and even believes that he is

God," and so forth (cf. Karagulla & Robertson 1955, Geschwind 1983).

A study of sudden religious conversion in 6 temporal-lobe epileptics (3 also had epileptogenic areas in frontal areas) revealed: hearing "divine music and angelic voices," "she heard a church bell ring in her right ear; and the voice said: 'Thy Father hath made the whole, Go in peace!'"; having "a day-time visual hallucination in which he saw angels playing with harps"; "he had a sudden dream-like ... flash of light, and exclaimed 'I have seen the light'," feeling "heavenly voices abusing him, felt rays were being shone on him to punish him (a sensation of burning)"; "terrified that I would not be able to carry out... the love of God.... [H]e also became paranoid, believing that he was being poisoned"; sensing "a holy smell"; believing "that he was able to pick up other people's thoughts," or "that he could understand other people's thoughts" (Dewhurst & Beard 1970).

Sudden alterations of activity in the hippocampus and amygdala can affect auditory, vestibular, gustatory, tactile, olfactory perceptions and lead to hallucinations involving voices or music, feelings of sway or physical suspension, the tastes of elixirs, burning or caressing, the fragrance of Heaven or the stench of Hell. For example, because the middle part of the amygdala receives fibers from the olfactory tract, direct stimulation of that part of the amygdala will flood co-occurring events with strong smells. In religious rituals, incense and fragrances stimulate the amygdala so that scent can be used to focus attention and interpretation on the surrounding events. In temporal-lobe epilepsy, the sudden electrical spiking of the area infuses other aspects of the epileptic experience with an odorous aura.

The hippocampus processes verbal and vocal signals, helping to link the intentions behind those signals (originating in the prefrontal cortices) to appropriate states of arousal and emotivity (via the amygdala and hypothalamus). Religious rituals sequence and rhythmically pattern these signals (prayers, preaching, incantations, chants) to infuse them with sustained affect, and to increase the motivation for any uses to which they may be put. In temporal-lobe epileptics, the hippocampus may be spontaneously stimulated to produce or interpret verbal signals as eruptive "voices" of unknown source and uncertain intention, which may threaten in the acute phase of schizophreniclike hallucination or soothe during remission (cf. Larkin 1979).

Hallucinations can involve different sensory modalities. Thus, the brain's

auditory, vestibular and visual channels are closely intertwined. The inner ear conveys both sounds and a sense of balance. In religious ritual, music or chanting can set the body to swaying, triggering pleasant feelings. Loud noises and irregular sound patterns can cause sudden, disorienting movements, triggering surprise and fear and temporarily throwing the body out-of-kilter (although people can become habituated to noise levels and idiosyncracies in sound patterns, so that what feels unpleasant to some feels pleasant to others). Loud music or sudden noises (as well as bright or flashing lights) can drive the epileptic into seizures marked by feelings of terror and paranoia.

Because of the innate adaptation of our moving bodies to the gravitational conditions on earth, the coordination of the retina's frame with the inner ear's frame gives us a proper sense of movement only when we are upright from the ground. When the two frames are thrown out of whack (moving on a boat, whirling in a dance, suddenly rising after lying down), the body says that you're moving but the ground lets you know that you're not. Notions of "up," "down," "side," "ceiling," "floor," and "wall" become confused. When ritually controlled, this disynchronization often induces an emotionally positive sense of floating, suspension, or slow motion in a fast-moving world. When uncontrolled, as in epileptic experiences, it can provoke a frightening, emotionally aversive sense of dislocation and bewilderment. It can also produce nausea (as in motion sickness) and perhaps a sense of being poisoned (nausea and vomiting may be adaptations for elimination of toxins from the body).

These and other findings concerning relations between religious experiences and temporal lobe epilepsy provide a main support for Persinger's (1987:113; cf. Persinger 1997) report that transient patterns of stimulation in the temporal lobe – especially around the amygdalohippocampal complex "create the God experience." The problem with his hypothesis from a neuropsychological standpoint is that it takes little account of the importance of agency and relations with the prefrontal cortices. The key issue here is that of functional connectivity, that is, temporal correlations between spatially remote physical events. In particular, frontal-temporal connectivity – and not just temporal activation as such implies a distributed rather than localized neural substrate for many types of religious experience. For example, disinhibited functions in the temporal

lobes (e.g., seizure foci) will generally elicit a compensatory response from inhibitory circuits in the frontal lobes. If Newberg et al. (2001a,b) are right about systematic alterations in the activity of the parietal lobe's orientation association area, then issues of connectivity become correspondingly more complex. For the present, though, I want to concentrate on what I think are the least controversial or at least the most empirically-supported arguments about frontal-temporal connectivity in religious experience.

Brain-imaging shows heightened electrical stimulation and increased blood flow to this area of the brain during bouts of epileptic seizure, schizophrenic hallucination, speaking in tongues and trance, and deep meditation and prayer. But whereas schizophrenia-like episodes of epilepsy and schizophrenic hallucinations appear to be associated with decreased activity in the frontal cortices (Stern & Silbersweig 1998), mediation and prayer seem to be associated with increased activity (Newberg et al.. 2001a,b). In pathological cases there is a corresponding, clinically apparent lack of awareness of reality, whereas in non-pathological cases there is a reported hyperawareness of reality.

In a study of 60 inpatients with schizophrenic or schizophrenic-like auditory hallucinations, Oulis and colleagues (1995) found high levels of conviction about the reality of the sensory stimuli, clarity of content, location of their source, and lack of volitional control. The voices associated with such pathological states indicate a dampening of subcortical interactions with the prefrontal cortices and an absence or submission of will (Joseph, 1990). The louder and more intrusive the hallucinations and intensity of delusional beliefs, the more anxious and fearful patients become, whether diagnosed as schizophrenics (Hustig & Hafner 1990) or temporal-lobe epileptics (LaBar et al. 1995).

A study of command hallucinations among 106 schizophrenic outpatients revealed the hallucinations to be often violent in content, leading to attempts to harm others (including innocent bystanders) or oneself (including 2 cases of command suicide) (Zisook et al. 1995).

The hallucinations and delusions associated with pathological states indicate a disconnection between self-will and the (supernatural) will commanding the hallucinations. Schizophrenics (and schizophrenic-like temporal-lobe epileptics) may say, "I am God," or "I am God's slave," or both. According to Stern and Silbersweig (1998:239), such "delusions of

control (or passivity) could result when a selfgenerated movement [e.g., self-generated verbally-mediated thoughts] is not associated with a sense of volition and /or is mistakenly believed to arise from another source, or both." These authors show that medial temporal activations (hippocampus) are prominent in hallucinating schizophrenics, but absent when control subjects listen to or imagine voices. Such temporal-lobe activations occur in the setting of a relative lack of prefrontal activity and corresponding deficits in executive functions that assign volition and agency.

By contrast, in non-pathological cases, neuropsychologist Patrick Macnamara observes: "[In] most accounts of mystical experience...the subject is invited to consent to the experience before it is given or "revealed" (see the the Annunciation to Mary in the New Testament). The suspension of agency and will, if anything, is antithetical to mystical experiences (if not to hallucinatory experience).... If there is a central focus to religious belief I would place it in the effort to develop the right relationships to the deity/deities... and all this in service to development of greater self-awareness.... These after all are major functions of both orbitofrontal and dorsolateral frontal lobes" (Personal communication, 2000).

A literature review reveals that intense prayer encourages self-control and self-esteem in which reduces both acute and chronic stress--which appear to depend heavily or prefrontal activation (Worthington et al. 1996). Newberg et al. (2001a,b) report EEG and SPECT data showing increased electro-chemical activity in, and blood flow to, the inferior frontal and dorsolateral prefrontical cortical regions during intense meditation and prayer. These areas send inhibitory efferents directly onto a number of limbic and brainstem sites implicated in stress: amygdala, hippocampus, hypothalamus, and locus ceruleus (the nuceli that manufacture the stress hormone, norepinephrine) (Hugdahl 1996). There is often a marked delusional misidentification of faces, even familiar ones, which may be related to "misinterpretation of social interactions" (Phillips & David 1995).

More generally, experiments from cognitive neuropsychology indicate that such schizophrenic patients have a deficit in their ability to appreciate other people's mental states. Subjects fail in the performance of tasks involving social inferences, such as correctly assessing intentions from indirect speech (Corcoran et al. 1995). This points to a malfunctioning "theory of mind" and intentional agency, which is patently not the case for

most people who have deep or periodic episodes of religious experience (including many of our political leaders).

Finally, schizophrenics with prefrontal deficits also seem unable to properly formulate or process counterfactual propositions that require imagining oneself in possible social words that differ from the actual one. For example, after a career failure or the death of a loved one, nonpsychotic persons often imagine "what might have been, if I had only done such and such." This is an ordinary behavior that seems to be lacking among some schizophrenics (Knight & Grabowecky 1995, Hooker et al. 2000). Although a common occurrence after death of a loved one is "dream sleep" (vivid and realistic dreams concerning the deceased that burst into awareness), the grieving subject is usually aware of the difference between dream and reality. Understanding counterfactual situations may be important for dissociating imaginations of the supernatural (e.g., the transubstantiated body and blood of Christ) from factually mundane observation and existence (ordinary wine and wafers), that is, dissociating the quest for self-awareness from the awareness needed for survival.

Autism is another form of psychopathology increasingly associated with deficits in "theory of mind" and faulty appraisals of social intentions (Leslie & Frith 1987, 1988, Baron-Cohen 1995). The term "autism" was coined by Kanner in 1943; however, until the mid-1960s, when the first epidemiological survey of autism was conducted in England (Lotter 1966), autism was considered a precocious form of schizophrenia (Goldfarb 1964). As with certain forms of schizophrenia and tempo-ral-lobe epilepsy, autistics often show abnormalities in the limbic region and associated areas of the brain stem. Autistic children have trouble remembering and processing recent verbal-auditory material, which is consistent with autopsy reports and clinical analyses indicating abnormalities in the hippocampus (Bauman & Kemper 1985, DeLong 1992). Studies of lesioned monkeys with damage to the amygdala reveal austic-like behavior associated with "hypoemotionality" (unnaturally fearless or tame, impairment in social interaction, aimless examination of objects) (Klüver & Bucy 1939, Bachevalier & Merjanian 1994).

Autistics also tend to manifest repetitive, rhythmic movements and "fixed memory" formulaic sequences akin to some forms of ritual behavior, but to no evident purpose. Catherine Johnson, a mother of two autistic children and

co-author of Shadow Syndromes (Ratey & Johnson 1998), nevertheless sees the use of these ritualistic movements as a stepping-stone for religious education:

"A child with autism can "get" the idea of God... For one thing, the repetition and ritual of religion is perfect... For another, I'm hoping that the visual power of the high church ceiling activates the "God part" of his brain.... Neuroscientists have found there is a region of the brain that, when stimulated, causes people to experience the presence of God." (www.feat.org/search/news.asp, "Autism and God," 18 September 2000)

One apparent problem with autism, as with certain forms of schizophrenia described above, is an inability to imagine counterfactual situations. This can be particularly striking in children suffering from Asperger's Syndrome, a high-functioning form of autism. They seem to be very literalminded and to believe exactly what they are told:

"We went overseas, and when the plane was over the clouds, he asked me: 'So this is where God lives? I can't see him.'" (accesscom.com/~hcross/mindblind.htm)

"My daughter is fixated with angels. My son told her that when you die you go to heaven and become an angel.... (Excited at this pointed) ("Goody, Goody!")... I barged right in the room and told her not to listen to her brother [for fear she would try to kill herself right there and then]." (Listserv by St. John's University for Asperger Syndrome)

To deal with such deficits in counterfactual thinking, St. Paul's Catholic Church in Alabama provides instruction for autistic children aimed at helping them to undertsand and take First Communion:

The church requires that children who receive Holy Communion be able to recognize the difference between ordinary bread and the Eucharist," said the Rev. Sam Sirianni, director of the office of worship for the Diocese of Trenton. The St. Paul's program was designed to teach the difference... but it also taught more basic things, like how to behave properly in church... learning how to behave in a crowded situation like a Mass was good for the children... people with autism often find crowds frightening, and the more situations they learn to deal with, the better. (Albert Raboteau, "Celebrating a Milestone," Austism Society of Alabama. National and World New Forum (web site), 25 June 2000).

Unlike hallucinating schizophrenics or temporal-lobe epileptics, however,

autistics do not usually misrepresent their own voices and intentions as those of other agents (including supernatural agents), or misinterpret the intentions of others as those of demons or deities. Rather, severe autistics show little evidence of inferring anybody's intentions (despite retaining other aspects of intelligence and intellect intact). Their world appears to be populated not by supernatural agents, or even natural agents like friends and enemies, but by mindless, zombie-like beings that have no autonomous will, desires or thoughts.

Recent studies indicate that in largely secular societies, like our own, where there is a history of separation between Church and State, extreme mystical states are generally attributed to cerebral pathology. But in societies where institutional religions dominate, the contents of hallucinations, delusions and possessed beliefs, as well as the diagnoses of their causes, are more generally taken to be religious in origin (Kent & Wahass 1997, Wahass & Kent 1997). Religious treatment may have positive or negative effects, depending upon the community's beliefs about the supernatural origins of the illness, such as whether the person is blessed by God or possessed by Satan.

These differences in belief, which determine different moral judgments about the mutual responsibilities of individuals and societies, can lead to social or political conflict. For example, in an unprecedented ruling, Chicago immigration officials recently decided to grant political asylum to a 10-yearold autistic boy whose mother had claimed his disability and sporadically violent behavior is so misunderstood in Pakistan, their homeland, that he would be tortured and persecuted if he returned there. In her successful application to the Chicago Office of Asylum, she stated that: "He was forced to undergo various degrading and dangerous mystical treatments consistent with the curse of 'Allah,' which is how the Islamic majority in Pakistan view his condition" (Deardoff 2001).

In Moslem societies such as Pakistan or Saudia Arabia, the religious community is obliged to recognize the asocial behavior of an autistic child or schizophrenic, a social problem requiring forceful intervention of the religious community. From the secular standpoint of US immigration officials and their medical advisers, this leads the boy's homeland community to "violate" the individual's rights. By contrast, in some states of the USA (e.g., Texas) medical diagnoses of severe and violent autism or schizophrenia imply no special secular or religious responsibility of the community towards

an individual who breaks a law. The individual may be even more radically isolated from society in prison and prosecuted (Western Europeans would say "persecuted") unto death (execution).

Whatever the religious take, there is an increasing scientific consensus that autism owes at least in part to alterations in the normal functioning of the prefrontal cortices, especially the ventromedial region that is involved in the affective assessment of social interactions and intentions (cf. Damasio 1994). There are massive subcortical connections between the prefrontal cortices, the temporal lobes and the limbic system. None of the religious pathologies that I have summarized – temporal-lobe epilepsy, schizophrenia, autism – implies a localized neural substrate for extreme religious experiences in the temporal lobe (or anywhere else in the brain).

Neurotheology: Claims and Doubts

In their most intense manifestations, ritual ceremonies and liturgy rivet attention on specific and conspicuous sources of sensory stimulation, including stimulation emanating from one's own body: drums or clapping hands, dancing or nodding, incense or sweat secretion, incantation or deep breathing, the light shows through stained-glass scenes or the making of signs and designs. Often, these actions and the associated stimuli induce altered states of consciousness: for example, through hyperventilation in whirling dance, deep-breathing meditation, or "going up to the mountain" (where the rarefied air leads to the effect). This focused sensory stimulation, in turn, undoubtedly arouses powerful emotional responses in the "limbic system" (hippocampus, amygdala, hypothalamus) much as naturally-provoked surprise, fear, anger and joy do (but in more controlled and sustained doses).

A possible scenario is that the overly-stimulated amygdala goes into undirected hyperactivity. It is unable to process the emotional significance of individual stimuli, though perhaps producing a general sense of foreboding. Consistent with this scenario (but by no means proving it), EEG patterns of electrical activation during "mystical experiences" bear striking similarities to those recorded during bouts of temporal-lobe epilepsy (Persinger 1983, Gloor et al. 1981, Geschwind 1983). The hypothalamus receives this confounding flood of information, relaying it to the autonomic nervous system. This provokes increased discharges in both the sympathetic (or egotropic) and parasympathetic (or trophotropic) branches of the autonomous nervous

system.

The sympathetic branch is responsible for priming the body for action, such as fight or flight. The parasympathetic branch carries signals that relax or quiet the body, such as rest and sleep. Augmented sympathetic discharges increase heart rate, blood pressure, sweat secretion, pupillary dilation, skeletal muscle tone, level of stress hormones (e.g., adrenaline), cortical excitation. Augmented parasympathetic discharges lead to corresponding decreases in visceral and skeletal reactions. In normal states, increased activation in the activity of one branch usually leads to decreased activity in the other. In mystical states, both branches appear to be activated simultaneously, although one or the other is usually dominant.

In meditative states, such as Zen Buddhist or Hindu Yogi, EEG patterns indicate a "trophotropic syndrome." Here, parasympathetic activity dominates, although continued sympathetic activity "seems in some way to be a correlate of the heightened perceptual sensitivity reported by such subjects" (Gellhorn & Keily 1972:399). According to Gellhorn and Keily (1972:402): "The principal psychological distinction from the normal would appear to be the suspension of autonomous will or intentionality." More frenzied mystical states, such as viscerally-charged (rather than meditative) trance-possession and Sufi whirling, may be characterized by an "ergotropic syndrome." Sympathetic activity dominates but continued parasympathetic activity may be associated with a concurrent sense of catharsis that is often compared to the after effects of sexual organism. Konrad Lorenz (1996[1944-1948]:267-268) describes an arousal syndrome in vertebrate predators similar to the "ergotropic syndrome." After prolonged effort and heightened arousal associated with chasing prey, an avian or mammalian carnivore experiencean acute "sensual pleasure" after catching it through the rapid, rhythmic movement of "shaking to death." This is followed by a particular form of emotional release:

"A striking predator finds itself in an exceptional state of maximal arousal.... Immediately after striking its prey, the bird shows the same degree of abreaction as a human being... directly after orgasm. Far from greedily beginning to devour, the raptor – even if it is very hungry – will first sit still for several minutes on its prey... and then embark on the slow, laborious process of plucking its prey, as though half-asleep. Even when the raptor finally begins to eat it, it does so in a 'dispassionate,' mechanical nature, as

though not quite conscious."

The hippocampus, which modulates the expression of emotions elicited by hypothalmic stimulation and provides conceptual significance to the emotions through projections to the amygdala (Joseph, 1982. 1990, 1992; LeDoux 1993), may also go into overdrive during rhythmically-induced mystical experiences. As a result, the regular channels of neural transmission are thrown out of balance. Evidence from SPECT brain-imaging is consistent with this possibility. Blood flow, and therefore traffic flow of signals between neurons, increases to the frontal lobes but decreases to the posterior superior parietal lobe (Newberg et al. 2001b). PET imaging indicates that the frontal lobes, particularly the prefrontal cortices, are associated with the executive conceptual functions of will and self control, as well as the self's temporal orientation (Wheeler et al. 1997). The top back portion of the parietal cortex, especially the left side, is associated with three-dimensional body imaging and spatial orientation (Lynch 1980). Possibly, the asymmetric flow of information towards the lower front of the brain and away from the upper back of the brain, may have something to do with the most outstanding aspect of reported mystical experiences: namely, a vivid but diffusely conceived awareness of a boundless universe, centered on (joined to, merged with) a self that has no physical markers or constraints.

One of the most completely developed "neurotheological theories" of these sorts of mystical experience that link brain and religion stems from the work of psychiatrist Eugene d'Aquili and radiologist Andrew Newberg. The authors use their own brain-imaging (SPECT) studies of meditating Buddhists and Franciscan nuns at prayer to demonstrate that experience of God, or "Absolute Unitary Being" (AUB), is hard-wired into the human brain (d'Aquili & Newberg 1998, 1999; Newberg et al. 2001a). Thus, for subjects who reported a feeling of boundless perspective and self-transcendence during meditation, the researchers found decreased blood flow in the brain's "object association areas" where perceptions between boundary and self are normally processed. They speculate that the ultimate mystical state of "hyperlucid unitary consciousness often experienced as God" (Nirvana, unio mystica, etc.) occurs when the sympathetic and parasympathetic systems are both discharging at maximal levels, with neither predominating (d'Aquili & Newberg 1998:200, 1999:26).

The authors see religious experiences as the result of normal, healthy

physiology, and not pathological or random events. With this, I agree. They conclude that the experience of God, which is potentially within us all, is as "real" as the experience of ordinary objects and events (Newberg et al. 2001a). With this, I have problems. Agreement about what is a rock or a person is individually and collectively much easier to come by than agreement about what may be a magic mountain or holy spirit.

D'Aquili and Newberg (1999:51-57, 164-176) postulate seven functionally localized "cognitive operators" that are "likely to be preprogammed into the brain." These operators "represent the way the mind functions on all input into the brain... sensory input, thoughts and emotions."

1. The Holistic Operator (right parietal lobe) allows us to conceive the world as a whole, and "to apprehend the unity of God and the oneness of the universe."

2. The Reductionist Operator (left parietal lobe) gives us our "scientific, logical, and mathematical approach... to the universe," but is also critical to understanding the totality of God and the universe in each of the parts.

3. The Causal Operator (left frontal lobe and left posterior superior parietal lobe), "permits reality to be viewed in terms of causal sequences."

4. The Abstractive Operator (inferior portion of the parietal lobe in the left hemisphere) forms general concepts from individual facts, including the concepts of "mathematics, government, justice, culture, and family."

5. The Binary Operator (inferior parital lobe) permits us to extract meaning from the world "by ordering its abstract elements into dyads... (e.g., good versus evil)." It is crucial to "mythic structure": "Myths... develop the notion that the opposites we see are actually illusory, a notion that comprise [sic] part of the ideologies of Buddhism and Hinduism."

6. The Quantitative Operator (inferior parietal lobe close to areas underlying the Binary and Abstractive Operators) abstracts quantity from the perception of various elements.

7. The Emotional Value Operator (limbic system) assigns affective value to percepts and concepts.

Operators (1) and (2) are reminiscent of Gestalt psychology and are so vague and general as to apply to virtually anything. No set of empirical tests or experiments could disconfirm their operation. As Maharishi Mahesh Yogi intoned: "atom and solar system, macrocosm and microcosm, self and universe, are all one and the same." Talk of pre-programmed operators is not

compelling.

Operator (3) is more specific and more plainly wrong. For the last couple of decades, researchers in developmental and cognitive psychology have begun describing functionally quite different causal mechanisms, including various types of mechanical and teleological causes (Sperber et al. 1995). For example, the type of mechanical causality (kinetics) employed by human neonates to interpret the movements of inanimate substances entails physical contact between causally-related objects and spatio-temporal contiguity along any causal path. By contrast, the type of telological causality (agency) that children apply to the interpretation of the causal interactions between animate objects, especially humans, assumes no physical contact between interacting objects or spatio-temporal continguity. Agentive causality is more closely associated with the prefrontal cortices. Moreover, these different types of causality have distinct maturation schedules in the brain.

Operator (4) is a relic of behaviorist psychology. Experiments in cognitive and developmental psychology and anthropology indicate that people do not first learn only specific facts before they abstract general ones (Rosch et al. 1976, Atran 1998). For example, people first come to understand that something is simultaneously an animal of a certain generic kind (e.g., a cat), only later do they come to categorize it as also being of a more specific (tabby) or general (mammal) sort of animal.

The learning sequence may be very different for other domains. Thus, people everywhere are more prone to initially individuate persons than to individuate animals or plants or rocks. This makes good evolutionary sense. It usually matters whether your conflict or liaison is with this Jones or that Smith, but not which bear can eat you or which apple you can eat. It makes little evolutionary sense to have a domain-general operation of abstraction or generalization.

For Operator (5), d'Aquili and Newberg (1999:55) reason that lesions in the inferior parietal lobe "prevent patients from being able to name the opposite of any word prescribed to them. This area is thus the seat of... the binary operator." But cutting neural pathways in areas that facilitate antonymy no more shows this area to be the "seat" of antonymy than cutting off air traffic over the

Mid-Atlantic shows the Mid-Atlantic to be the seat of the air industry. In any event, antonymy is only one kind of binary contrast ("cat" isn't an

antonym of "dog," "mouse" or "kitten" but can be opposed to them).

Operator (6) supposedly accounts for quantification. Now, quantity is not extracted from perception of elements, but is imposed by placing them in one-to-one correspondence with an abstract cardinal set (class of similar classes), such that the last correspondence counted is the number assigned (7 windows and 7 flocks of birds are both just 7). There may be different innate components to number concepts (Hauser 2000). For example, Chomsky (1986) suggests that the notion of discrete infinity attaching to number is a by-product of the language faculty. There is much anecdotal evidence in anthropology, and a recent unpublished study in psychology, indicating that some nonliterate peoples can't determine cardinality (past four) because they simply haven't had the cultural need to put the various components of quantification together. (Needless to say, all such societies have religion). Apparently, such people perceive a difference between, say, 24 and 32 claps but not between, 22, 23, 24, 25, or 26 claps (Susan Carey, personal communication). Similarly, the application of number to space (extension), which characterizes Western science (rulers, coordinates, etc), was until recently alien to the rest of the world (and to the world's religions). There is no evidence such cultural breakthroughs involved rewiring of the inferior parietal lobe, or that even the simpler components of number reside there.

Operator (7) is a catch-all for "affect." Cognitive theories of emotion, such as appraisal theory (Leventhal & Scherer 1987, Ellsworth 1991), suggest that the value structure of emotions is organized very differently from the relations among emotions in the limbic system. In an aversive situation, for example, anger and sadness may have nearly matching cognitive value structures (anger involves the perception of a responsible external agent, sadness doesn't), as may fear and hope (which differ only on valence) (Keltner et al. 1993). Nevertheless, anger has more physiological and "limbic" manifestations in common with fear than anger has with sadness, or fear has with hope.

Brain researcher Rhawn Joseph (2001) proposes another ambitious version of neurotheology: "[C]ross" neurons as well as "mystical/religious" feeling neurons… probably evolved 30,000 and perhaps 100,000 years ago – possibly in reaction to the experience of "cross-like" stimuli in nature [e.g., dead trees that take the form of a cross, birds that fly with extended cross-like wings] coupled with feelings of fear or religious awe…. The sign of the cross

is not uncommon and when staring at a cross the temporal lobes are activated.

Using similar logic, however, how can one exclude competing claims for the primacy of (Moslem) crescents, (Jewish) stars, (Native American) circles, and (Indo-Aryan) swastikas? Mystics of all creeds regularly signal appearances and apparitions in nature of their favorite forms. And what about those Achulean "triangles" 250,000 years ago?

Joseph's claim that Neanderthals already had a definite religious sensibility rests on sparse and controversial data. A number of paleoanthropolgists question whether Neanderthals ceremoniously dealt with death: "Neanderthals buried their dead only to discourage scavengers and eliminate odor" (Rudavski 1991:44). Flower pollen could have been carried to the grave by the wind or the feet of mourners (Johanson and Edgar 1996:100). Underground streams could have led to accumulation of bear bones in cave niches and to groups of fallen1r6o4of blocks. This would produce the illusion of an intentionally made storage pit (Chase and Dibble1987). There is also the possibility that the conventional aspects of Neanderthal burials may have lacked symbolic charge owing to deficient prefrontal cortical development (a sharper flexion of the cranial base in modern humans tucked the face under the frontal lobes to allow prefrontal development, Balter 2002:1221).

Although, as Joseph points out, temporal and frontal lobes are admittedly involved in religious symbolism, Joseph locates the "abode of God" for each individual within the limbic system. Here also is the seat of "limbic-religious blood lust" and "limbic taboos, [such] as eating and sexuality." Because "sex and food (along with fear, rage, and aggression) are probably the most powerful of all limbic emotions," they are also probably chief "motivators" of religious ritual. An alternative account of the prominence of food and sex in religious ritual might simply be that controlling them is a good way to keep religion in mind: religion-motivated abstinence fires religion-mediated desire.

As argued by Joseph, based on his "genetic seeds of life" theory of panspermia: "[I]f… there is no hereafter or spirit world, then why has our brain become adapted for perceiving and dreaming about what supposedly does not exist. Why would the limbic system evolve specialized neurons… that subserve the capacity to dream about… spirits, angels, and… the souls of the dear departed? … We see because there are people and objects to view

…. If there was nothing to visually contemplate we would not have evolved eyes or visual cortex…. Shouldn't the same evolutionary principles apply to religious experience? …. A true scientist would not rule out such a possibility."

But the fact that we have neurons that "subserve" some capacity tells us little if anything about their evolution, much less about adaptation. We also have "specialized neurons" that subserve a host of mundane perceptual illusions. Does this fact justify the inference that such neurons were naturally selected or ordained to produce perceptual illusions?

Finally, Joseph takes the fact that most human DNA is not active as evidence for natural evolution from and towards spirituality: So much unused capacity needs purpose, namely, as a biological reservoir for evolution as a progressive learning process towards a more complete and active understanding of God: "Although temple priests masquerading as scientists have claimed that life miraculously emerged fully formed from the dust and muck of the earth."

Many people never have a full-fledged mystical experience, yet are affectively committed religious believers. Although about one-fourth to one-third of American and British subjects polled report having had a "religious experience" in their lives (Hay 1990, Spilka et al. 1992), only 2-3% claim to have had an intensely emotional "mystical experience," such as feeling all things in the world are one (Thomas & Cooper 1978, Hay & Heald 1987 cited in Beit-Hallahmi & Argyle 1997:79). We know next-to-nothing about the neurobiology of the vast majority of run-ofthe-mill religious experiences and beliefs that sustain most people's faith.

Conclusion: Mystical Episodes May Inspire New Religions, But Don't Make Religion

Stressful personal episodes become religious experiences by instantiating publicly-relevant schemas. Within such cultural schemas, even the eccentric voices and visions of clinically-diagnosed schizophrenics and epileptics can become publicly-sanctioned revelations, as they are in some societies. The religious hallucinations and delusions of schizophrenics, the sensory enlightenments of temporal-lobe epileptics (the Apostle Paul or Saint Theresa de Avila?), and the mystical visions and voices of persons are at the extreme end of the "normal" distribution (Jacob, Jesus, Mohammed, Maharishi

Mahesh Yogi?).

In historically seminal moments, their unpredictable, "miraculous" revelations have undoubtedly inspired common belief in divine intention and grace. Malfunctioning or hyperactive theories of mind and intentional agency are cognitively and emotionally ripe for supernatural cooptation. Revivalist and starter cults are more likely than established religions to acknowledge the divine character of these religious sects aim to radically reform or recreate religious obeisance "by carrying it to some degree of folly or extravagance." A startling episode of intense sensory arousal in a face-to-face with the supernatural may prove unforgettable and emotive enough to permanently inculcate religious belief in a person, and perhaps to jump-start new belief in society.

Previous neurobiological studies of religion (including neurotheology) have focused on tracking participant's neurophysiological responses during episodes of religious experience and recording individual patterns of trance, vision, revelation and the like. This has favored comparison of religious experience with temporal-lobe brain-wave patterns during epileptic seizures and acute schizophrenic episodes. Cognitive structures of the human mind/brain in general, and cognitions of agency in particular, are usually represented in these studies in simple-minded terms (binary oppositions, holistic vs. analytical tensions, hierarchical organization, etc.) that have little input from, or pertinence to, recent findings of cognitive and developmental psychology. Perhaps more telling is recent work on the role of the prefrontal cortices in processing concepts of agency and self and in cognitive mediation of relevant emotions originating in (what was once called) "the limbic system."

For the most part, however, relatively few individuals have emotionally arousing mystical experiences, at least in our society, although the overwhelming majority of individuals consider themselves to be religious believers (polls over the last 30 years consistently show that well over 90% of Americans profess religious convictions). Neither is there any evidence that more "routine" religious experiences have a characteristic temporal-lobe signature, or any other specific type of brain-activity pattern. The neurophysiological bases that commit the bulk of humanity into the care of supernatural agents remain a complete mystery.

21. Neuroscience and Spiritual Experience

by Fraser Watts
Faculty of Divinity, University of Cambridge, England.

Abstract. It is suggested that the most fruitful way of relating religious thinking to brain function is via a functional formulation of the cognitive subsystems that are grounded in the brain, and which support religious cognition. This chapter focuses on the application of the Interacting Cognitive Subsystems approach to religion. The main focus is on the two central subsystems concerned with different aspects of meaning: the propositional system concerned with specific meanings, and the implicational system concerned with generic, schematic meanings. It is argued that, in these terms, religious meanings are quintessentially implicational. However, complex issues arise about how the two meaning systems arise in religious

cognition and in religious practices such as meditation, and how they produce religious phenomena such as the sense of ineffability. One of the central challenges for theology is to find a way of articulating religious meanings in a way that is faithful to the kind of cognitive code in which they arise.

There are broadly two strategies for relating religious cognition to brain function. One is to seek to map religious cognition directly on to areas of the brain. The other is to go via an intermediate level of cognitive systems that are themselves grounded in brain function. This paper takes the second of those routes, and it may be helpful to begin by stating the case for doings.

The recent development of scanning technologies has made it much easier than before to relate particular kinds of cognitive functioning to areas of the brain. Studies of which areas of the brain are involved in meditation are one example. Though there is much of interest in such research, it also has limitations. One problem is how to get people to perform religious thinking (or other religious activities) in a reliable way, despite the constraints imposed by scanning technology. Also, whereas basic low level cognitive tasks may be performed in a standard way with no significant individual differences, high-level cognitive functions such as those involved in religion and morality are much more subject to individual variation in how they are performed. Further, the analysis of scanning data always involves a good deal of smoothing and averaging, in which potentially significant micro-data is lost.

Most serious of all, there are problems of interpretation. It is of verylittle scientific interest simply to know which parts of the brain are employed in a particular cognitive activity. That is only of scientific interest if we can interpret such mappings, and fully understand the functional significance of particular parts of the brain. Despite all that has been learned about mind-brain mappings, the significance of particular brain areas can often only be interpreted in a rather gross way. Though it can be assumed that there are particular brain circuits underpinning religious cognition, it is hard even to locate those circuits without knowing what kind of circuit you are looking for. Even if circuits are located, that tells very little about how they work. It is therefore advisable to adopt the complementary strategies of both (a) trying to develop a good theory of the cognitive systems involved in religious cognition, and also (b) considering the relation of those systems to the brain. Each strategy can enhance the other, though the first priority ought to go to

developing a model of the cognitive systems that one can then look for in the brain.

In this chapter, the emphasis will be put on that cognitive systems approach. It is an approach comparable to that of d'Aquili and Newberg(1999), whose work is perhaps the best known mapping of religious cognition. They first relate religious cognition to a general formulation of cognitive functions (their set of nine cognitive 'operators') and then go on to suggest the brain areas that subserve each of the operators. Though it is welcome that they try to identify the neural substrate of each operator, there may be problems with any simple mapping of the cognitive operators on to areas of the brain. For example, the range of functions served by the causal operator are very diverse, ranging from casual assumptions in visual perception to those involved in religious thinking. It stretches plausibility to assume that exactly the same areas are involved in each case. of the cognitive architecture. It must, of course, be onethat is potentially relevant to religious functioning. There is as yet no consensus about the general cognitive architecture; each approach has its own strengths and weaknesses, both in terms of cognitive functions and neuropsychology. The psychology of religion requires an approach in which higher level processes are particularly well mapped; some of the available approaches are not sufficiently well defined at this level to be suited to the study of religion.

d'Aquili and Newberg's approach is attractive from this point of view in that it sets out the kind of higher level cognitive processes that arelikely to be relevant to religion. Though it is intended to be a general model capable of a broad range of applications, it has in fact been mainly applied to religious and mystical states of mind. The approach that will be considered here, the 'Interacting Cognitive Subsystems' (ICS) model of Teasdale and Barnard (1993), is in some ways comparable to the cognitive operators approach of d'Aquili and Newberg. ICS is also intended to dealwith cognitive functions comprehensively, and to have a broad range ofapplications. Indeed, an advantage of ICS is that it has already been applied to a broad range of topics in cognitive psychology. Applications to religious cognition thus represent a new application of a model that has proved its worth elsewhere and begun to gain general acceptance. It will beargued that the ICS approach clarifies some aspects of religious cognition,such as the ineffability of religious experience, that the d'Aquili and Newberg approach does not.

INTERACTING COGNITIVE SUBSYSTEMS

ICS was developed originally in the context of psycholinguistics (Barnard,1985), and has been applied in contexts as diverse as human-computerinteraction (Barnard et al, 1988), the onset of sleep (work in progress by Barnard and Watts), and depression (Teasdale and Barnard, 1993). The present paper, building on previous work by Watts (1999, 2002), will explore its application to religion.

ICS offers a general cognitive architecture consisting of nine distinct cognitive subsystems, three sensory systems (acoustic, visual, body-state),two intermediate systems (morphonolexical and object) that captureregularities in sensory input, two effector systems (articulatory and limb), and two central meaning codes (propositional and implicational). Eachsub-system has its own code, and information processing is accomplished through transforming information from the code of one subsystem to that of another. Attention here will focus mainly on the two highest level subsystems, the propositional and implicational subsystems.

In brief, the propositional subsystem is concerned with 'knowing that' (i.e. being aware of semantic relationships), whereas the implicational subsystem is concerned with a more holistic or intuitive mode of knowing. Propositional meanings are relatively specific, while implicational meanings are much more general or schematic. It is proposed that there is a complex interaction between the two meaning systems, with much cross-talk betweenthem. Much that is coded in the implicational system will be transformedinto the different code of the propositional system, and vice-versa.

The codes of the propositional and implicational systems may differ in a way that is rather like the difference between serial and parallel processing. Implicational meanings often seem to be inherently parallel and distributed, and would be best modelled computationally along connectionist lines. Propositional meanings, in contrast, seem more capable of being adequately modelled by the serial processing of classical computational modelling.

The proposal developed here for the role of cognitive subsystems in religious cognition will be limited in two ways. It will confine itself almost entirely to the two central subsystems that are concerned with meaning, and which will be particularly important in religious cognition. However, it

would be possible for future work to focus on the more limited role of the peripheral subsystems in religion. For example, some of thediscussion of perceptual and motor processes in religion offered by Pruyser (1968) could be formulated in terms of the more peripheral subsystems of ICS. The focus here on just two of the nine subsystems of ICS is comparableto the focus of d'Aquili and Newberg on just two of their nine cognitive operators in modelling religious experience.

The other limitation is there will be little discussion of exactly what the neural substrate of the subsystems might be. Little has so far been published about this, though work on it is in progress, and there arepreliminary indications of the relevance of the orbito-frontal cortex to the implicational system (Joseph, 1996, 2000; Teasdale at al, 1999). Both general considerations and accumulating evidence (Joseph, 1996, 2000; McNamara, 2001) suggest that the frontal areas are likely to be important in religious cognition. Mapping ICS subsystems onto the brain is a complex task, because exactly what areas of the brainare involved in particular operations of the central meaning systems isl ikely to depend on the context and focus of particular operations. Though the neural substrate of ICS is an important matter for the future, this brief paper is not the place to begin to explore it.

THE GENERIC NATURE OF RELIGIOUS MEANINGS

There are good reasons for emphasizing the importance of the implicational subsystem for religion. Teasdale and Barnard suggest that implicational meanings are more 'holistic' in that they embody a sense of overall meaning that is greater than the sum of particular elements of meaning, and cannot readily be conveyed in a single sentence. The implicational system also has a direct linkage with bodily and emotional states, in a way that is not paralleled for the propositional system.

Religious meanings are perhaps the most holistic of all meanings. The religious world-view seems to be unique in the range of views and experiences that it integrates. There is probably nothing else that brings together aesthetics, morals and metaphysics in the same way as religion. In this sense, religious meanings are perhaps uniquely general and integrative; they link different domains of experience and reality together in very broad meaning structures.

Religious meanings are also very general in the sense that they identify

common motifs that arise in very different contexts. For example, the death-to-resurrection theme is a highly general one that can be discerned in very different contexts. Trinitarian thinking, which identifies a basic threefoldness in reality in which the three elements are distinguishable but inseparable, is another very general motif. This all suggests that religious cognition is characteristically implicational, and indeed Teasdale and Barnard (1993, p. 74) specifically discuss the role of poetry and the spiritual traditions in evoking and conveying implicational meanings.Religious awareness is perhaps the quintessential function of the implicational system.

In addition, religious meanings are often figurative, as Watts and Williams(1988) have argued. Figurative thinking is, in some ways similar to the use of metaphors. However, the concept of metaphor, as it is normally formulated, assumes that literal meanings are prior, and that literal explication is possible in principle. Religious metaphor is characterised by holistic, figurative meanings such as light, which in Christian thinking brings together several different threads: God as the source of all light, the light of understanding, right conduct as being a path of light, and soon. The concept of light in religious thinking is more than an optional metaphor used to convey something that could equally well be said literally. It ties together diverse strands of meaning in a broad gestalt of meaning and finds general elements of 'light' that apply in very different contexts. There is an irreducibility about figurative thinking in religion that is notfound in metaphors proper. It is not just that metaphors are common in religion. They carry core and indispensable ideas that cannot easily be explicated in literal language (Watts and Williams, 1988, chapter 9).

It has often been noted that the sense of the unity of all things is a core mystical experience. Indeed, it would be one of the strongest candidates for an element that is common to the mystical experiences of different traditions. The sense of unity is something that would be expected to arisefrom the capacity to discern broad patterns of meanings that is the essence of the propositional system. d'Aquili and Newberg (1999) handle this interms of a particular mode of operation of the holistic operator. However, a sense of unity would also be expected to arise from the holistic meanings of the implicational system.

INEFFABILITY

There are some things that can be understood implicationally that cannot easily be propositionalised. This is the phenomenon of ‘knowing more than we can say’ (Nisbett and Wilson, 1977), when things that are grasped intuitively cannot be formulated in a way that is capable of explicit expression. You can sense that a model fits without being able to articulate exactly what the model is. It is now widely recognised that much information processing proceeds outside conscious awareness, and some is not at all easy to formulate consciously. For example, there may be subtle characteristics that determine whether we like or dislike particular people.Though we may know perfectly well how we react to others, it can be much more difficult to identify which features have determined our reactions.

In a similar way, there is a rich tradition of religious experiences being felt to be ‘ineffable’, and defying adequate expression. There is scepticism about this claim in some quarters (e.g. Proudfoot, 1985) and it has been suggested that ineffability is merely a social construction, a learned wayof ineffable makes perfectly good sense. Ineffable experiences are presumably those that arise in the implicational system, and are coded there. The sense of ineffability arises from the difficulty of translating a certain core of implicational meanings into any other code.

The majority of meanings in the implicational system can quite readily be transformed into the different code of the propositional system. However, there seem to be some implicational meanings for which there is no direct propositional equivalent, and religious meanings are perhaps more likely to fall into that category than any other. Propositonal meanings are characteristically linear and logical, whereas religious meanings often defy translation into that kind of code.

In fact, over the centuries, mystics have written volumes about their‘ineffable’ experiences; and that has always been something of a paradox. ICS makes sense of that too. Even where propositional meanings can betranslated into the different code of the propositional system, that might be associated with a sense of loss. Because it is a different code, there would obviously be a sense in which the original meaning had not been fully captured. Translation from implicational to propositional code thus makes sense of the paradoxical features that ineffable experiences (a) can actually be expressed in some form, though (b) only with a sense of loss that the original meaning has not been properly expressed.

PROPOSITIONAL RELIGIOUS THINKING

It must be presumed that the implicational subsystem is phylogenetically the older, i.e. that the grasp of regularities and meanings at this sub-propositional level is the basic capacity, from which the capacity for propositonal meanings has been differentiated. Indeed, the distinctive cognitive capacities of humans, such as the capacity for language and reflective self-consciousness seem to be linked to the development of apropositional system as a distinct and independent subsystem. Equally, the evolution of the capacity for religion (Mithen, 1996), which seems closelyassociated with reflective and differentiated consciousness, and a sense ofself, also presumably depends on the development of the propositional systemas a distinct subsystem.

There is thus something of a paradox. On the one hand religious meanings seem to be quintessentially implicational, but on the other hand the capacity for religion seems to have required the differentiation of an independent propositional system. However, it would probably be misleadingto suggest that religious cognition is exclusively a function of either system. Perhaps religious cognition depends on the cognitive richness and flexibility that arises from the combination of both the propositional and implicational subsystems. This leads to the question of the nature of the relationship between the two subsystems in religious cognition.

Normally, there is ready cross-talk between the two meaning systems. However, there is also scope for a degree of dissociation between them. The distinction between these two subsystems suggests a typology of religious experience and theological approach, according to which system is in the driving seat. As we have seen, meanings that are coded in one system may noteasily be translated into the different code of the other system, and at least some religious meanings may fall into this category. The contemplative approach to religion seems to be one in which the implicational system isstrongly emphasised.

However, there are also approaches to religion that seem to be largely propositional. It is perfectly possible for propositional insights to remainmerely propositional. Teasdale and Barnard illustrate this in terms of aSufi story. The Sufi master, Uwais, was asked ‘How do you feel?’ Hereplied, ‘Like one who has risen in the morning and does not know if he

will be dead in the evening'. The other man said,

'But this is the situation ofall men.' Uwais responded, 'Yes, but how many of them feel it' (Teasdale and Barnard, 1993, p. 74).

There are clearly parallels here with approaches to religious cognition in which religious insights are learned at a propositional level but, for some reason, are not easily translated into the deeper codes of the implicational system. Religious insights would then be seen or heard, would be encoded propositionally, and could be written or otherwise expressed, without being encoded in a way that embodied awareness of a wider range of relationships,or involved links with other domains of experience.

Developmental evidence suggests that religious experience initially occurs in the rather inarticulate form that is associated with the implicational system. More analytical aspects of religious understanding, of a kind that would be associated with the implicational system, develop later. Recent work with young children suggest that religious experience is common and important, though not much expressed (Hay and Nye, 1998). It gradually fades though the first decade of life, perhaps because children sense that it isnot much valued by adults or their peers. While that is happening,children gradually develop the capacity for analytical religious thought, as has been well established for some time (e.g. Goldman, 1964). There thus seems to be a developmental shift from religious experience that is primarily implicational to religious thinking that is primarily propositional.

COORDINATION BETWEEN THE MEANING SYSTEMS

Though there can be a degree of dissociation between the two meaning systems, and though many religions meanings can be either propositional or implicational, religious thinking often involves a close integration of the two systems. Under specific conditions, unusually close linkages between the propositional and implicational systems can be set up. This is analogous in some ways to the 'interlock' that Teasdale and Barnard describe in depression, in which very general negative meanings in the implicational system are translated into a series of more specific negative attitudes in the propositional system, which in turn reinforce the more basic, general negative outlook coded in the implicational system.

With religious cognition, there may be a somewhat similar but more benignform of close coordination or enmeshment between the two systems.

In thiscase, basic intuitive religious meanings would lead to a stream of articulate, propositional religious ideas and expressions, which in turn would strengthen more basic, in articulate religious meanings. Religious worship may, in part, be an occasion where people deliberately enter such a state of close co-ordination between the two meaning systems.

However, whereas depressive interlock is a perseverative state from which peopl ecannot easily extricate themselves, the close co-ordination between the meaning systems that arises in religious contexts is a form of harmonious enmeshment of the systems that people can enter and leave at will.

The kind of enmeshment between the two systems found in religious contexts may be similar to that which occurs in love. When two people are in love, there seems to be a basic, pervasive attitude of positive valuation towards the partner. This leads to more propositional expression of statements of love for the other, which in turn strengthens the basic attitude of love. Provided both systems are involved, and the enmeshment is maintained,expressions of love arise from, and further reinforce deeper implicational meanings. For this to work, both systems need to be involved. Mere propositional ideas, unconnected to deeper implicational meanings, can degenerate into empty repetition. Equally, implicational meanings that find no form of expression are unlikely to develop, and so may not be fruitful for the person who holds them.

Religion may not only involve an enmeshment of the meaning systems; it may actually facilitate a fruitful and harmonious relationship between them. Atone extreme, a situation can arise, as it does in severe mood disorders, in which the subsystems are locked together in a perseverative way that cannot respond flexibly and adaptively to changing patterns of stimulation. At the other extreme, the sub-systems can operate in a totally uncoordinated way. Neither is adaptive. Religious practices may help to establish fruitful co-ordination between the systems, without their getting locked together. It may thus help to facilitate a state of balance and stasis between the subsystems.

MEDITATION

Some religious practices, such as meditation, seem designed to bring about an unusual relationship between the cognitive subsystems. However, it is not easy to know exactly how that should be characterised. Indeed slightly

different practices may have significantly different cognitive results.

Teasdale at al (1995) offer one formulation of the effects of mindfulness. They suggest, plausibly enough, that people often perform many different cognitive operations at once, and that there is little co-ordination between the various different systems. Such cognitive 'multi-tasking' leads to the familiar sense of feeling distracted. In contrast, Teasdale et al suggest,mindfulness involves an unusual integration of the different subsystems, in which all systems, from the body system (where the breath may become acentral focus) to the central meaning systems, are working together in an integrated way, producing a sense of unified, focused attention.

However, other formulations of the effect of meditation in terms of ICS are possible. Meditation may sometimes involve the near shutting-down of some systems. It normally involves at least the shutting down of the normal processing of verbal input. That suggests that the morphonolexical and articulatory systems are shut down in meditation as far as possible. It maywell be that a key purpose of that may be to affect how the meaning systems operate. Shutting down the more peripheral language systems may help toreduce activity in the propositional system.

There is the possibility that meditation leads to the two systems being partially dissociated for a periodof time in what might be regarded as an altered state of consciousness. Many religious practices seem designed to bring about an unusual state ofconsciousness, and this may well involve an unusual relationship between the propositional and implicational subsystems.

Suspending the normal cross-talk between the implicational and propositional systems may be necessary if people are to focus on the distinctive holistic meanings of the implicational system, especially those core meanings that defy adequate translation into propositional code. Meditative consciousness, in which religious meanings are perhaps experienced in an unusually pure form, may involve an explicit adoption of a kind of 'broad-band' attention, as Watts and Williams (1988) call it, inwhich very general meanings can be experienced holistically.

DISCUSSION

Watts and Williams (1988) discussed a distinction in religious cognition similar to that explored here between the implicational and propositional

systems, though they did not present it in the context of a systematic theoretical framework. For example, they distinguished analytical and non-analytical modes of person perception and suggested that there is ananalogy between contemplative cognition and the non-analytical, intuitive perception of another person involved in empathy (p. 63). Equally, they made use of the distinction between insight in psychotherapy that is merely intellectual and insight that is actually effective (pp. 70-74) and suggested that the latter is also in some ways like contemplative cognition. However, useful though such analogies may be, there is also a need for a rigorous theoretical formulation of this kind of distinction, and this will require a multi-level theory of religious cognition.

The case for a multi-level cognitive theories has become clearly apparent in the related but better developed field of emotional cognition, as Williams at al. (1997) have argued. Several possible approaches have been formulated, each of which makes a distinction not unlike the one ICS makes between implicational and propositional cognition. The earliest such theorywas that of Leventhal (1984), in which what he calls 'schematic' cognition is similar to the implicational system in ICS, and what he calls 'conceptual' cognition is similar to the propositional system in ICS. Another somewhat similar distinction has been made by Epstein (1994) between rational and experiential knowing. The key question arises of whether ICS makes any unique contribution to the understanding of religious cognition that could not be made by other approaches.

The advantage of ICS lies not so much in how the distinction between the levels or systems is made, but in the detail and specificity of the surrounding assumptions. For example, ICS is much more specific about thepossible relationships between the different subsystems. Thus, for example, it is much easier to develop a formulation of religious ineffability in terms of ICS than other similar theories. Equally, there is not enough detail in other theories to formulate the kind of enmeshment between the two systems that can be modelled in terms of ICS, or of how meditation might affect cognitive processing.

Nevertheless, one of the most important implications of this kind of approach to neurotheology is a rather general one. Theology, like any academic discipline, necessarily proceeds at a propositional level. However, in the case of theology more than most disciplines, this imposes a severe

limitation. If it is correct, as has been argued here, that religious meanings are so general and holistic that they are quintessentially implicational, any attempt to formulate them in the propositional code that academic disciplines need to use will inevitable fail to express them adequately. The familiar point of contemplatives about the ineffability of mystical experience perhaps applies more broadly than has often been recognised to the formulation of all religious meanings. Perhaps all propositional accounts of religious meanings will, in this sense, be deficient.

This invites a double response from theology. Firstly, it indicates that the discipline should be undertaken in a spirit of humility that recognises the inevitable inadequacy of all propositional formulations of religious meanings. Secondly, it suggests that it would be appropriate to look for innovative ways of formulating religious meanings that are a little more faithful to their inherently holistic, implicational character. It would be beyond the scope of this paper to explore such innovative formulations ofreligious meanings in detail. The general point is that propositional formulations will often be inadequate, and that innovative formulations should be considered.

22. Atheism, Religious Conversion & The Logic Of God

by Matthew Alper

WHY ARE THERE ATHEISTS?

"What is going to happen to those of us who want to believe but aren't able to? And what is to become of those who neither want to nor are capable of believing" (Ingmar Bergmann, 1957).

In discussing my ideas with others, one of the questions most frequently asked has been, "Ifhuman spirituality represents an inherent characteristic of our species, if we truly are 'wired' to believe in a spiritual reality, then why are there atheists?" In essence, if we are "wired" to believe in a spiritual reality, how is one to explain those who don't?

Though we may all exist as a part of the same species, no two human beings are exactly alike. As similar as we might be, each of us is a unique composite of physical and cognitive traits. Whereas some of us are born to be taller than average, others are shorter. While some have exceptional vision,others are born blind. While some are more musically or mathematically gifted, others are born deficient in these areas. As a matter of fact, the distribution of every genetically inherited trait can be charted by a Bell Curve.

To demonstrate, let's apply this notion to a basic physical characteristic such as vision. Though the majority of our species is born with average

eyesight and will therefore fall somewhere within this curve's mean—its bulge—there exists a much smaller percentage of individuals within every population that represent one of this curve's tapering ends. Whereas one end of this curve is represented by those born with superior vision, on the opposing side, there will most probably exist an equally small number of individuals who are born with inferior vision, with some, on the extreme edge, who are totally blind. This same principle can be equally applied to a cognitive trait such as musical ability. Though most of us are born with an average capacity to develop a range of musical skills from composing to playing an instrument, each population possesses a smaller percentage of individuals who fall into one of this curve's two tapering tails. On one end, every culture possesses a minority of those born musically gifted. At this end's extreme, there exists an even smaller number of musical savants and prodigies such as Mozart, for example. Meanwhile, on the opposite extreme of this same curve each population will most likely possess an equally small percentage of those born tone deaf, who, though they can hear, lack any inherent musical intelligence and who don't even have a capacity to learn music skills.

Furthermore, for every capacity we possess, cognitive or otherwise, there must exist a physiological site from which that capacity is generated. Our capacity for vision, for instance, is directly related to the caliber of our eyes and visual cortex. Similarly, our capacity for music is directly related to the caliber of those parts of the brain responsible for generating musical ability. We could therefore say that whereas someone like Mozart must have been born with an unusually overdeveloped musical part of his brain, someone less gifted is most probably born with a less developed part of the same.

This, of course, is not to exclude the environmental factor. Though each of us is born with a certain degree of inherent potential in any number of abilities, the degree to which we actualize those latent potentials depends on to what degree we nurture and cultivate them. Had I, for instance, been provided with a great deal of musical instruction from early childhood on, I'm sure I would possess a greater degree of musical ability than I do today. Nevertheless, even with the most intensive musical training conceivable, there's no way I could have ever matched Mozart's skills simply because I was not born with the same genetic potential to achieve that level of ability.

The same holds true for the opposite scenario. Mozart, for instance, were

he born to peasants, indentured to toil the fields, without the same opportunity to study music as he had, would never have reached the level of genius he achieved in his life. In such a case, he may have instead merely grown to become "the guy who whistles really well while tilling the soil." Unfortunately, in the same vein, latent Mozarts, Einsteins and Michelangelos probably die every day without the slightest recognition simply because they were never afforded the opportunity to fully actualize their inherent genetic potentials. I'm therefore suggesting that while life experience (nurture) plays a significant role in our cognitive developments, we can only reach as high as our inherent genetic potentials (nature) permit.

So what does any of this have to do with the question of atheism? Since I'm suggesting that spirituality and religiosity are generated from specific regions within the brain, must not the aforementioned Bell Curve principle apply to these inherent proclivities as well? If we in fact possess neurophysiologically-based spiritual and religious mechanisms, then wouldn't it make sense that the average person from any given population would probably possess an average potential for either of these intelligences? (To reassert the distinction between spirituality and religiosity, we must realize that though they usually operate in tandem with one another, one can still be born with any combination of these two unique impulses. For instance, though one might be born with an underdeveloped religious impulse, an overdeveloped spiritual sense may exist. Such an individual, might not be inclined to attend church or observe religious rituals, but might be very spiritual, and highly prone to "transcendental" experiences. On the other hand, there are those who are hyperreligious, though aspiritual. Such individuals, though they may never have a spiritual or mystical experience, or feel compelled to contemplate any "higher" truth or reality, might be obsessed with the rigid adherence to church doctrine, custom and code. It is these individuals who are most prone to the dangerous excesses of religious fanaticism.)

Regarding these same Bell Curve's tapering extremes, every population should therefore also possess a smaller percentage of those born with either an enhanced or diminished capacity for either of these two distinct cognitive traits.

Regarding those who fall into the mean of the spiritual curve, such individuals are likely to possess enough spiritual intelligence that they will be

predisposed to believe in some form of a transcendental reality, along with supernatural beings as well as an afterlife through which they will perceive themselves to be immortal, thus enabling them to circumvent their fear of death. These are our masses, the bulge of the spiritual Bell Curve, those who have kept spiritual ideals along with religious institutions thriving for all these years as an integral part of every human society.

Regarding this trait's tapering extremes, on one end of this curve are those born with an overdeveloped spiritual function, those for whom spirituality will play a predominant role in their conscious experience. On the farthest extreme are those who, even as early adolescents, will be delivering heartfelt sermons from the pulpit, those of whom we might say were "born with the spirit in them." These often turn out to be our prophets, zealots, and spiritual leaders, in essence, those born with an overdeveloped spiritual function.

On the opposite end of this same curve there are those we might call spiritually deficient, those born with an unusually underdeveloped spiritual function. Just as a person born blind is lightinsensitive, those born with an underdeveloped spiritual function are spiritually insensitive, incapable of fully grasping, appreciating or experiencing the concept or implications of any spiritual reality.

Such people rarely, if ever, will feel compelled to worship or pray, to consider or contemplate the concepts of a spiritual reality, a god, a soul, or an afterlife. Such people are unlikely to ever have a spiritual experience. These are our society's spiritually retarded, if you will. It is here that we will find the neurophysiological origins of those with a proclivity to become agnostics, atheists, rationalists, and secularists.

To again account for the environmental factor, we must realize that lack of belief (atheism) is not exclusively dependent upon one's genes. In many cases atheists are those who, though they might be inherently spiritual, were raised in a nonreligious or aspiritual environment, in which case their innate proclivities may have atrophied and consequently been substituted by a secular world view. At the same time, there are also those who, though inherently spiritual, have become so disenchanted with organized religion they've chosen to suppress their inherent proclivities and consequently deny a belief in any religion or God. As most atheistic ideologies are based in the mere denial of God's existence, I would like to stress that no philosophy can be justifiably upheld without possessing some underlying logic through

which to substantiate its basic principles. Without such a logic, what is referred to as a philosophy is really nothing more than just another groundless belief system, founded in emotion rather than reason.

As I see it, this is the essential problem faced by today's Atheist Movement. Rather than possessing an inherent wisdom of its own, the atheist movement relies on the logical shortcomings of those faiths it seeks to contest. And though it's true that no religion has ever been able to defend its precepts with reason, no legitimate philosophy can stand on gainsay alone. The contradicting of one belief system does not validate the tenets of another. Establishing that something is not white, for instance, does not necessitate its being black. Analogously, finding fault in the convictions of every world religion does not constitute proof that there is no God. Consequently, if we are ever to advance a viable atheism, it must possess its own logical foundation, one I believe it is finally provided with, through this new science of neurotheology.

RELIGIOUS CONVERSION

"...to whom is the arm of the Lord revealed?... He is despised and rejected of men; a man of sorrows, and acquainted with grief..." --Isaiah

When we speak of a person being born again, we are generally referring to someone who has undergone a religious conversion. When we see someone who has spent a life leading a secular existence suddenly devote themselves to an organized cult or religion, this is usually the result of a religious conversion. When someone with whom we used to go to the bars and baseball games with is suddenly spending their days handing out religious pamphlets in the streets shouting to every passerby that "Jesus Saves!" or "Blessed be Allah!" this, too, is most likely the result of a religious conversion.

Perhaps we've known someone close to us who has undergone such an abrupt personal transformation or perhaps we've only seen such people as they've proselytized their newfound faiths in the airports or streets. Regardless, the fact that this psychological phenomenon occurs in a certain percentage of every world population implies that it represents yet another integral aspect of our species' inherent neural processing.

Just as we are the musical, emotional and linguistic animal, we are also

the “converting” animal, the animal whose sense of personal identity can be suddenly and drastically transformed in such a way that religious concerns come to predominate our conscious experience. In his book, Varieties of Religious Experience, William James was one of the first to document this uniquely human behavior. As James expressed it, “to say that a man is ‘converted’ means that religious ideas, peripheral in his consciousness, now take a central place, and that religious aims form the habitual center of his energy”(James, 1902).

For people who undergo religious conversions, individuality is replaced by ideology and very little room is left for personal growth or expression. Because the converted believes that the newfound faith determines all things, all sense of personal responsibility is relegated to some religious credo or God. To the converted, all that occurs does so because God willed it as such. No matter how ordinary or mundane an event may seem, God is suddenly viewed as responsible for everything. Should something unfavorable occur, it is only because “God works in mysterious ways.” Tragic events become “blessings in disguise,” as those converted are overwhelmed with a sense of being saturated in God’s presence and love. This type of experience is related by John Wesley, the founder of Methodism. He referred to it as a feeling of “...the heart strangely warmed...” (Wesley, c.1703-1791), during his own conversion. Is it possible, as has been demonstrated with meditative, mystical or neardeath experiences, that such sensations have a direct correlation to changes in one’s neurophysiology?

Concerning the conversion process itself, though some take place in a slow and gradual manner, the majority of cases occur very abruptly. Many psychologists, such as E.S. Ames, favored “restricting the term ‘conversion’ to sudden instances of religious change” (Hood, 1996). G.A. Coe also thought that the use of the term conversion should be limited to those cases in which the individual undergoes an intense and sudden religious change. The only other time a person’s core personality undergoes such an abrupt and drastic change is when stricken by an organic psycho-syndrome or psychosis. Being that both of these are listed as disorders in the DSM-IV, one has to wonder why we have yet to view religious conversion in the same light.

In studying the etiology of religious conversion, we need to look at those triggers that seem to precipitate the experience. According to the psychologist Paul Johnson, “A genuine religious conversion usually occurs as the outcome

of a crisis of ultimate concern and a sense of desperate conflict" (Hood, 1996).

In his book, Religious Conversion: A Bio-psychological Study, the psychologist S. De Sanctis asserts that "all the converted speak of their crisis, of their efforts, and of their conflicts which they have endured" (De Sanctis, c. 1862-1935). In his work, The Cognitive and Emotional Antecedents of Religious Conversion, C. Ullman discusses studies he conducted in which he compared psychological traits of those who had undergone a religious conversion and those who had not. Ullman found that: Converts recalled childhoods that were less happy and filled with more anguish than those of nonconverts. The emotions recalled for adolescence followed similar childhood patterns, with the addition of significant anger and fear in adolescence for the converts and not the nonconverts. Converts also differed from the unconverted in having less love and admiration for their fathers and more indifference and anger towards them (Ullman, 1982).

After studying 2,174 cases of religious conversions, the psychologist E.T Clark noted,"Sudden conversions were associated with fear and anxiety" (Hood, 1996).

If we were to look for a pattern, it would seem that those most susceptible to undergoing this type of sudden cognitive transformation are those with frail senses of identity; people with unhealthily developed egos; or those who were abused or neglected by their parents, without whose love they were never able to feel secure in the world. When such a child grows, it may not possess the inner strength required to endure life's ordinary trials and tribulations, thus catapulting that person into a state of emotional crisis. When their crisis reaches a threshold, a breakdown occurs in which the suffering individual latches onto to some religion to which they will soon convert.

Follow-up studies show that after such deeply troubled individuals undergo their religious conversion, their emotional states generally tend to improve. According to a study done by J.B. Pratt,

"Prior to conversions, individuals had a tendency to wallow in feelings of unworthiness, self-doubt, and depreciation that are released or overcome via conversion" (Pratt, 1920). Yet another study showed that, "It is typical of conversion to be preceded by morbid feelings in which doubt, anxiety, internal strife, and despair are replaced by serenity, peace and optimism"

(Ostow, 1953). Apparently, for those who suffer severe emotional turmoil, there are obvious benefits in undergoing a religious conversion.

This notion that those overwhelmed by stress are most vulnerable to undergoing a conversion is no secret to many religious groups, who intentionally seek out the lonely and afflicted because they know they are most likely to succumb to a conversion. The theologian, Lewis Rambo, points out that certain religious groups such as the Evangelical Christians make it part of their practice to target vulnerable individuals (Rambo, 1995). For example, in large urban areas, some churches focus on ministries to those recently divorced as they know that within the first six months after a divorce, a person is more likely to be converted. This practice of seeking out those in crisis is most evident among prison populations, worldwide, where stress levels are critical and conversions are practically endemic. Another example in which the vulnerable are targeted for conversion is practiced by recovery groups such as Alcoholics, Eaters, Gamblers, and Debtors Anonymous all of which emphasize—through the use of the renowned "12 step" program—faith in religion and God as primary tools in their effort to combat these addictive behaviors. When one is trying to overcome an addiction, they experience a sharp rise in stress levels, thus leaving those with addictive disorders as attractive candidates for a conversion.

Because a percentage of every population undergo this type of sudden behavioral change, it suggests that religious conversions most likely constitute yet another inherent characteristic of our species, a genetically inherited reflex response to overwhelming crisis or anxiety. If this does, in fact, constitute a physiological reflex, it would suggest that there must exist some specific neurophysiological mechanism responsible for generating this type of behavioral response.

It appears that the human capacity to endure reality is so tenuous that Nature had to install our species with an emergency back-up sense of identity —a religious one—to replace our secular ones when they can't provide adequate relief from our excess anxieties. Depending on to what degree one is genetically predisposed to undergo a conversion, we each have our own personal threshold for pain and duress that we can withstand before we, too, become vulnerable to undergoing this type of cognitive transformation. It appears that when a person reaches their own personal anxiety threshold, rather than to engage in some self-destructive behavior, such as drug abuse,

as so many do, one's "normal," secular-self shuts down and is immediately replaced with an alternate hyper-religious one. Once the converted individual's cognitive transformation is complete, there is relief from of all those anxieties that were attached to the previous identity. All past fears are washed away and replaced with rapturous contentment (again, sensations that can, more than likely, be measured with the use of a SPECT scan or fMRI).

The human ego is a very delicate organ. If it is not properly nurtured, a person may grow to develop any number of insecurities, neuroses or even psychoses. When an individual with a weak sense of self reaches the preliminary stages of adulthood, they may not feel ready or able to take on life's responsibilities. Perhaps this is why religious conversions "typically occur during adolescence" (Hood, 1996). This is further supported by the research of psychologist Paul Johnson who concluded that "after surveying five studies conducted on over 15,000 people, the average age of conversion was 15.2 years" (Hood, 1996).

This is not to suggest that religious conversion only occurs during adolescence, for it can strike at any age that a person feels particularly vulnerable or threatened. Nevertheless, it is during adolescence that we are generally afflicted with increased anxiety levels as it is during this life passage that we are told by our parents and societies that we're soon going to have to fend for, and support ourselves. Moreover, it is usually during adolescence that we must first come to terms with the concept of our own mortality.

With all of these concerns, questions, pressures, and responsibilities suddenly thrust upon us, it is no surprise that it is during this same stage in our development (usually between the ages of 15-20), that humans undergo the most cases not only of religious conversion, but of suicide, drug abuse, anorexia, depression, and schizophrenia. It is also no wonder that the majority of conversions take place at this same age, as research suggests increased religiosity can lead to a reduction in a number of self-destructive behaviors. Regarding that most self-destructive act of all, suicide, an article entitled "Religiosity and United Stated Suicide Rates" reported that, "Church attendance remains negatively correlated with suicide rates" (Martin, 1984). This was further supported by research done by H.G. Koenig who concluded in his work Aging and God that among the elderly "faith suppresses suicidal thinking." After interviewing a number of individuals, Koenig found that

many expressed that “the promise of a happy afterlife” helped to thwart any suicidal inclinations (Koenig, 1994). In a journal reference appropriately titled, “The Effect of Religion on Suicide,” the team of Stack and Wasserman found that a belief in an afterlife helped to counter self-destructive impulses (Stack, 1992). Apparently, those who do not believe in a spiritual reality are more prone to engaging in self-destructive behaviors than those who have faith. Perhaps it is for this reason that religious conversion can save individuals from succumbing to self-destructive acts that we are reluctant to classify it as either a problem or a disorder.

Moreover, it is interesting that when a person converts to a sanctioned religion we tend to be that much more accepting of it, yet when one joins an unsanctioned belief system—what are referred to as cults—we feel compelled to seize that person from the “insidious” clutches of that group or influence. Regardless of how we choose to perceive this strictly human phenomenon, we must accept that it represents another cross-cultural characteristic of our species and therefore, more than likely, another genetically inherited behavioral trait, reconfirming the notion that spiritual and religious experiences can be directly related to our biologies and not to some ethereal influence or God.

THE LOGIC OF GOD: A NEW “SPIRITUAL” PARADIGM

“We are what we think. All that we are arises with our thoughts. With our thoughts we make the world” --Siddhartha, c. 525 BCE.

“Projection makes perception. The world you see is what you gave it, nothing more than that. It is the witness to your state of mind, the outward picture of an inward condition. As a man thinketh so does he perceive. Therefore, seek not to change the world, but choose to change your mind about the world” (A Course In Miracles, 1975).

“The real voyage of discovery consists not in seeking new landscapes, but in having new eyes” (Proust, c. 1913-1925). et al (translated by: C. K. Scott-Moncrieff (Translator), Terence

“An evolution of consciousness is the central evolution of terrestrial existence...a change of consciousness is the major fact of the next evolutionary transformation” --Aurobindo,1963.

According to the 18th-century German philosopher Immanuel Kant, all

perception is contingent on the manner in which an organism processes information. For example, when I experience an apple, I am reliant on the make-up of my perceptual mechanisms, my sense organs—my eyes, ears, tongue, nose, and skin—to acquire knowledge of the fruit. Once all of this sensual data is assimilated, my brain then has to integrate all the information in such a way as to invoke the comprehensible experience I refer to as an apple. Our conceptions of reality are therefore really nothing more than the products of internally generated cognitions projected onto the world around me, "the outward picture of an inward condition" (A Course in Miracles, 1975).

Being that every species possesses its own unique set of perceptual mechanisms as well as its own unique processor or brain, every species must therefore interpret reality from its own unique perspective. Accordingly, my experience of an apple is very different from a worm's, a fly's or a monkey's. This is not to say that my experience is more "real" or "true" than any other creature's, just different. Consequently, no species can ever possess absolute knowledge of anything, but instead only relative knowledge, relative to the manner in which that species processes and consequently interprets reality.

As Kant expressed it, we can never possess absolute knowledge of "things-in-themselves" (Kant,1781), only relative knowledge of "things-as-we-perceive-them." Just as flies possess fly knowledge, humans possess human knowledge. And just as flies possess fly "truths," humans possess human "truths," neither being any more authentic or real than the other. We must therefore accept that such lofty notions as absolute truth or knowledge are unattainable ideals to which we will never have access. Instead, we are forever bound to our relative and subjective human perspectives which are framed by the manner in which our sense organs and brains process information. Consequently, to understand what we refer to as reality, we first need to understand the underlying nature of how our brains process information.

According to the cognitive sciences, the human brain consists of an interactive network of separate regions, each which processes information in its own unique way. These are our cognitive functions. Consequently, to better understand the nature of how our brains process information, we first need to understand the nature of each of these interactive cognitive functions. Examples of human cognitive functions include: a language function which

consists of our Wernicke's and Broca's areas as well as our angular gyrus; a variety of emotional functions, which mainly reside in the brain's limbic region; a moral function centered within the prefrontal cortex; and a spatial and temporal function which inhabit the parietal lobe; a personal identity function which resides within the right frontal cortex.. As a matter of fact, for every perception, cognition, emotion, sensation, or behavior our species demonstrates, it is likely we possess a cognitive function from which that experience or behavior is generated. It is the role of each of these distinct cognitive functions to process a multitude of data, each in its own particular way. Only after all of this separately processed data has then been integrated are we provided with a comprehensible perception of our reality.

So what if we were to apply this same precept to human spirituality? What if spirituality represents the manifestation of one of our brain's cognitive functions? As it is a cross-cultural proclivity to perceive a spiritual realm, isn't it possible that spirituality may represent one of the ways our species is "wired" to process information and consequently to interpret reality? If so, it would imply that our spiritual beliefs in concepts as a god, a soul, and an afterlife also constitute nothing more than manifestations of the way our species happens to process information and therefore to interpret reality. In such a case, God would no longer represent any Absolute Being but rather a cognitively generated, relative one. Such a hypothesis would imply that God, as we've thus far interpreted Him, as a real and absolute entity, is, as Nietzsche suggested, dead. No longer an absolute reality, God is reduced to just another one of our species' relative perceptions, the manifestation of an evolutionary adaptation-a coping mechanism-instilled in us so that we can endure life's sufferings as well as our unique awareness of death.

It may be difficult for many people to accept such a reductionistic, evolutionary, organic, cognitive, rational, that is, scientific interpretation of God. Because the majority of our species is literally hardwired to perceive a spiritual reality, it may be impossible for many to grasp, as it may conflict with their inherent perceptions of reality. Subsequently, trying to convince someone who is hardwired to believe in a spiritual reality that no such thing exists may be as futile as trying to convince a person suffering from schizophrenia that the voices heard are coming, not from without, but from within. This is not to suggest that our spiritual perceptions represent the manifestation of any physical dysfunction, as is true with illnesses like

schizophrenia. On the contrary, spiritual consciousness represents a normal part of the human cognitive experience.

But, what if we could somehow convince a person dealing with hallucinations to recognize them as nothing more than the products of internally generated misperceptions? Granted, in the case of viewing an actual object like an apple, our perceptions are based in some external reality, but that doesn't mean that the human brain isn't capable of producing a variety of hallucinations and confabulations. When, for instance, auditory hallucinations are reported or phantom limb pain is expressed, the experience is as "real" to the person as is the apple on my desk is to me. In essence, cognitively generated delusions are a familiar human phenomenon. What if we could somehow teach the person to reason through the delusions? Similarly, what if our entire species could be taught to reason through the possibilty that our beliefs in the supernatural are delusional? What if we could come to recognize and accept that such beliefs aren't representative of any actual external reality but are, instead, the manifestations of internally generated misperceptions? What if we could recognize that spiritual consciousness exists as the consequence of a neurophysiological reflex? Just as planarians reflexively turn toward light, humankind reflexively turns to a god.

Let me borrow, for a moment, from Ridley Scott's 1982 science fiction film, Blade Runner. Imagine an android is programmed to believe it is human. In order to make the android believe such a thing, the manufacturer installed a computer chip into its circuitry which instilled it with fictitious memories of a fabricated past. Now imagine that the android were to suddenly become aware of its true nature. Suddenly, it realizes not only that it is an android, but that its memories are nothing more than the effects of a computer chip that compels it to perceive a delusional past. Now that the android has become cognizant of its true nature, it would be free to explore the possibilities of a whole new paradigm. No longer bound to the false reality with which it was programmed, the android would now be able to redefine its own destiny, able to explore new possibilities in accordance with its"truer" nature.

Analagously, imagine humans were to suddenly become cognizant of the fact that we've been programmed by the forces of natural selection to perceive a spiritual reality, one which is just as fabricated as our android's

fictitious past. Just as the android had been constructed with computer chips that frame its thoughts and behaviors, humans are analagously constructed with cognitive functions that do the same for ours. What if in the same way that our android recognized its memories existed not as the recollection of actual past experiences but rather as the consequence of a program installed into its circuitry, we came to recognize that spiritual consciousness exists not as the effect of any actual transcendental reality but rather as the consequence of an organic program? Perhaps if we learned to regard spirituality in such a way, we too could devise a whole new paradigm for ourselves, one through which we could redefine our own destinies based on our truer natures. Rather than being stuck in the same delusional consciousness Nature forged for us, we could use this newfound selfknowledge to reach for a healthier and more productive vision of ourselves. Should we choose to embrace such a new "spiritual" paradigm, it might mark the advent of a whole new era for us, one based on such principles as self-actualization, equality, justice, and compassion, things that are all too often lacking in today's societies.

Another metaphor to be considered, is to imagine we are looking into a mirror that we believe offers a pure and perfect reflection. Now, imagine that placed between us and the mirror is actually a series of lenses, previously imperceptable to us, but that have actually distorted our view. Because of our ignorance of these lenses, we have no way of knowing that we have been visually deceived. Though we may believe that our view represents a perfect reflection of ourselves, we are actually misinformed. Until we know these lenses exist, until we know to look past them, to push them aside, we will never be afforded a true reflection of ourselves.

I believe that human spirituality represents such a lens, one that distorts our view of reality by making us perceive a spiritual element when no such thing exists. Interestingly enough, this lens distorts the perceptions of philosophers and scientists as much as anyone else. From newfangled "quantum" definitions of spirituality, to the paranormal sciences, or the archives of metaphysical philosophy, all represent various ways that spiritual consciousness has distorted man's quest for a rational conception of reality. Whether it be through quantum notions of a random principle or paradoxes used by Zen Buddhists, medieval metaphysicians or Christian ontologists, we seek to explain what we regard as incomprehensible as proof of a transcendental quality in the universe.

What if we were to become aware that such a lens existed? What if we were to choose to push it aside, clearing our perspectives of all such "spiritual" distortions, affording ourselves a much clearer, less obstructed view of reality? Sure, it might be somewhat uncomfortable at first, even distressing, to have to readjust our perceptions of ourselves in such a fundamental way. But wouldn't we prefer to possess a more perfect view of reality than a distorted one? Shouldn't we prefer truth over deception?

What I'm suggesting is that spiritual consciousness constitutes "Nature's white lie," an inherited misperception selected into our species to help alleviate the debilitating anxiety caused by our unique awareness of death. But would Nature do such a thing as to program a species with an inherent misperception? Well, as odd a notion as it might seem, Nature has no regard for such lofty human more survivable creature, that is, one that can more effectively pass its genetic material onto future generations-this and nothing more. The author of The Selfish Gene, Richard Dawkins, expressed this same notion,

"We, and all other animals, are machines created by our genes…We are survival machines, robot vehicles blindly programmed to preserve the molecules known as genes" (Dawkins, 1989).

As terrifying as the prospect of death might be, if such an organic theory of spirit and God happens to be correct, isn't it in our best interests to embrace the reality of our situation? Can anything really be gained by living in conscious denial? If science which has brought us so many life-enriching technologies can prove that this is an impulse, then why would we choose to ignore this? As is the case with any white lie, we have to ask ourselves wether we would rather live in contented ignorance, or embrace the truth? How we choose to answer this may stand as one of the pivotal decisions in determining the outcome of our species' future.

23. The Temporal Lobe: The Biological Basis Of the God Experience

by Michael A. Persinger
Professor of Behavioral Neuroscience, Depts. of Psychology and Biology,
Laurentian University, Sudbury, Ontario, Canada

The extraordinary development of the human brain cannot be denied. Whether this change is considered to be a product of long evolution or of sudden occurrence does not alter the profound importance of the development. With the increased size of the brain relative to body mass, the human species obtained an unprecedented ability to comprehend the universe.

Certainly the most important change for the later emergence of human societies was the enlargement of the frontal lobes. This portion of the human brain occupies about one-half of the total cerebral capacity. Its proliferation allowed the predominance of two important behaviors: the ability to inhibit

and the ability to anticipate.

The ability to inhibit impulses was primary to the survival of even the first social groups. Groups cannot be maintained unless the impulses of the component individuals are kept in check. When each member feeds or fights or copulates according to selfish and egocentric impulses, the group behavior deteriorates. The culture dies.

Modern society is replete with inhibitions. They are translated as "Thou shalt not." We cannot kill a person because we feel like it; we cannot engage in sex with another whenever it suits us. We must learn to inhibit our behaviors. As long as the human brain can inhibit, complex societies can be maintained. People who have not learned to inhibit, either because of inadequate training or due to some biological error, are considered the criminals of culture. They are removed from its presence and killed or preserved in some safe place. Such people cannot be allowed to run free if society is to survive. The ability to inhibit contributes to clear logic and sharp thinking. During problem solving, we can exclude or inhibit the thousands of memories or thoughts that could interfere. Instead, we can concentrate upon a crossword puzzle, talk about politics to a buddy in a bar, or calculate the size of distant galaxies. People who cannot inhibit irrelevant responses do not talk or think in clear and crisp patterns. These people free associate, talk in nonsense, and confuse words and phrases. Sometimes they are called schizophrenics; most of the time they are just called crazy. For a variety of different medical reasons, they have a chronic lack of the ability to inhibit.

The ability to inhibit is a fragile commodity within each of us. Its strength is weakened by alcohol, fatigue, and mindbending drugs. During these periods of intoxication, concentration is difficult and memory comes and goes. Images of hate, impulses of revenge and sexual desires, typically inhibited by a history of punishment, emerge into awareness.

The second consequence of the frontal lobes is the capacity to anticipate. As the frontal lobe grew larger and more complex, the human species began to anticipate not just the next few seconds or days, but an entire life. Accompanying this anticipation was the experience of time.

Prediction and anticipation have great survival value for the human species. They are the foundation for hopes and idealistic goals. They allow the development of complex technologies and sophisticated social systems. However, anticipation is a two-edge sword. As long as the anticipated event

is positive in nature, great strides can be made. People work to save for the future. Children are conceived to replenish the race and crops are planted for the expected harvest. The anticipations are associated with joy and the vicarious identification of endless survival.

What the human species gained in the ability to plan and to anticipate, it paid for by the experience of anxiety and apprehension. When the anticipated event is negative, we do not experience happiness or an expectation of fulfilment. Instead, we are debilitated by feelings of doom.

During such a period, we are incapacitated. The ability to think is lost and all the fine discriminations fade into one confusing, confining form. We feel our hearts pump and the walls of the room appear to move in around us. Sometimes we feel like we are about to die.

And that's the crux of the problem. With the ability to anticipate the future, the human brain also developed the potential to acknowledge self-death. We can plan and construct great structures, but we can also anticipate our own demise. Death is the end of individual experience, the time when the thing called your "self" appears to terminate. It is perhaps the greatest unknown of them all. By its very definition, it contains the terrors of the most horrific human imaginations. The consequences can be devastating.

However, at the same time the frontal lobes were burgeoning with their capacity to inhibit and to anticipate, another part of the human brain was changing. This portion of the brain, called the temporal lobe, also grew in size and expanded outward from the sides of the major mass.

The structure of the temporal lobes was aptly formed for the demands of the new human brain. It contained a central area where sound could be experienced and understood in either space or time. Through the connections to the frontal lobe and other portions of the brain, regions of the temporal lobe contributed to speech. This sudden development of the capacity to speak was strongly correlated with the ability to think. By processes that are not yet technically clear, these properties were preconditions for the appearance of the phenomena known as awareness and experience.

The developments did not end here. Two important structures, the hippocampus and the amygdala, began to migrate deep within the brain. As the neocortex grew in size, the hippocampus was slowly pushed backward and down to the side of the brain until it rested deep within the temporal lobe. The amygdala was pushed, laterally, to within the lobeas well. The

appearance of the two structures within the temporal lobe contributed to two important properties: the experience of remembering and evaluation. With the development of these structures, experiences could be labelled as rewarding or punishing. More importantly, they could be remembered. To accommodate this expansion, marked variations in the brain's architecture occurred. An extra fold or convolution appeared within the primate cortex immediately adjacent to the hippocampus. From this new region emerged massive fibers that sent out and received information from all over the brain.

The hippocampus became the gateway to the experience of images. Appropriate stimulation of this region of the human brain could unleash a vivid stream of past memories. It could also initiate an inundation of rich fantasy over which the experiencer had little control. One of these processes, whose intimacy with memory consolidation is clearly evident, was the experience of dreams.

The amygdala became a control center for the display and experience of emotions and moods. The potential for fight or flight and the experience of anger or fear evolved together. With the coupling of these emotions to mood, the human animal could experience the heights of euphoria and the depths of depression.

Because of the connections to the frontal lobes and the upper portions of the temporal lobe, the emotions became mixed with the experiences of the self. The sensations of being a person, a real entity, a unique thing in this universe, became tied to the guts of the organism. With this mixing came the exhilaration of self-preservation and the fear of personal extinction.

A biological capacity for the God Experience was critical for the survival of the species. Without some experiences that could balance the terror of personal extinction, the existence of the human phenomenon called the "self" could not be maintained. It would have been fragmented by the persistent, gnawing realization that death could come at any time. Initially, the God Experience may not have had a particular representation. Although there is no known way to re-create the experiences of the first human brain as it contemplated this cosmic event, the first experience may have been a kind of "cosmic serenity".

It was probably much like the Hindu-Buddhist concept of Nirvana, whereby a person experiences a quiescence. Within this quiescence, there is no fear, no anxiety, only the sensation of becoming a part of everything. The

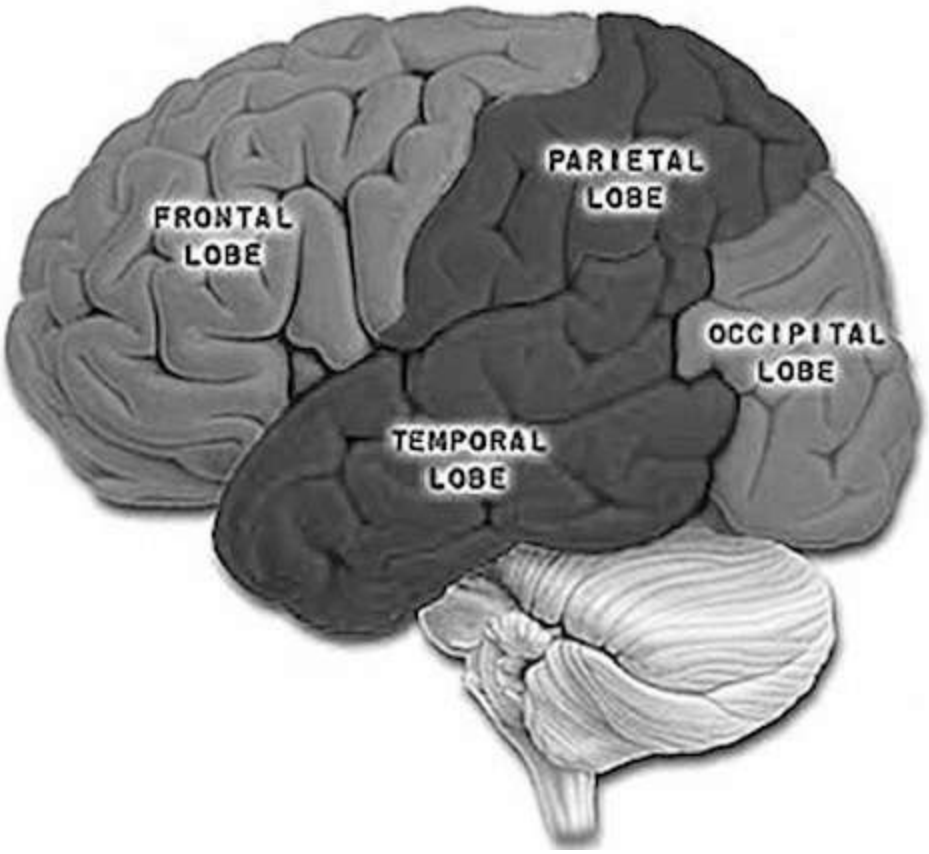
words may be poetry but the survival value is real—the person can cope with the anticipation of self-annihilation.

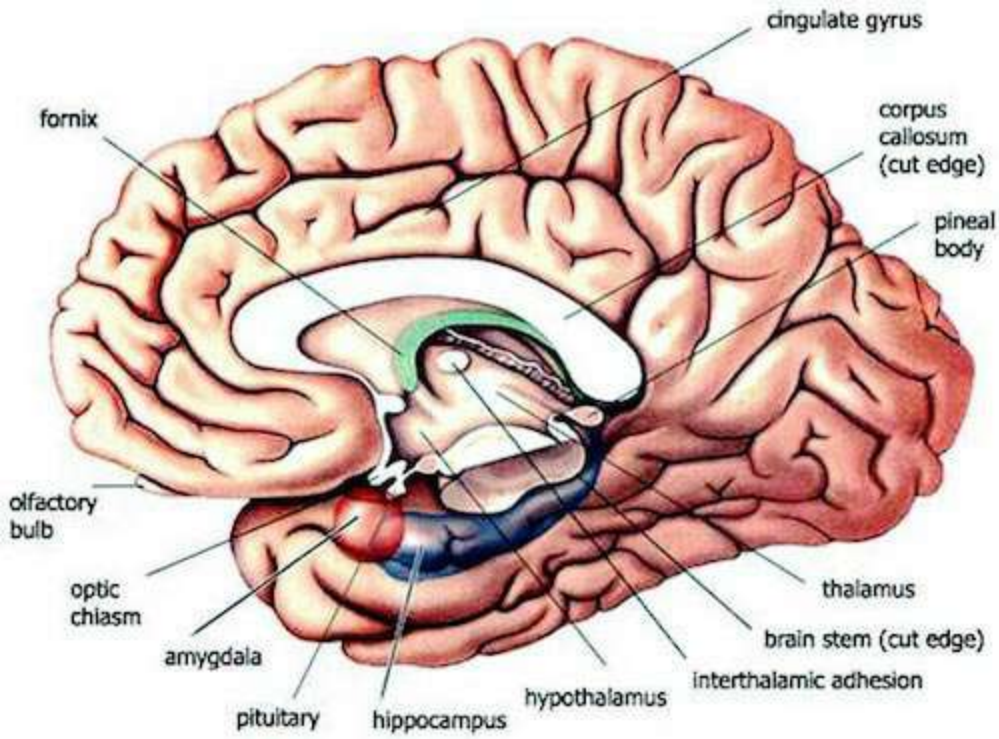
The capacity to have the God Experience is a consequence of the human brain's construction. If the temporal lobe had developed in some other way, the God Experience would not have occurred.

I am not contending that the God Experience is localized within the temporal lobe, nor more than vision is stored within the occipital lobe or the body image is stored within the parietal region. Instead, my hypothesis is that the God Experience is a phenomenon that is associated with the construction of the temporal lobe.

All of us, by virtue of our primate heritage, have this capacity. Some of us may regress to it, others may enhance it, and still others may be embarrassed by its presence. Like the propensity to walk and to talk, it is a potential in each of us. We may just know it by different names. Of course, the best test of this idea would be to compare our species with a similar form that did not have the same development of the temporal lobe. Optimally, this fictional creature would have the same development of the other portions of the brain but without the odd positioning of the hippocampus and amygdala or the massive connections between the temporal and frontal lobes. To date, such a comparison has not been possible. Instead, to test the neurobiological basis of the God Experience, we to have a God Experience, then those individuals with the appropriate alterations in the temporal lobe should report enhanced occurrences. Although the details should be highly variable, they would show the general themes of religious behavior.

Such changes can be discerned within the temporal lobe. The hippocampus, for example, is notoriously prone to deterioration due to insufficient blood supply, inadequate oxygen levels, or deficits in essential nutrients. Because of the odd geometry of its blood vessels, the hippocampus is prone to deteriorate from thickening of the arteries. Even a small alteration in the temporal lobe tissue produces pronounced and crude behaviors. Damage to the hippocampus produces some of the densest amnesia known to medical science. However when there is no memory there is no past, and when there is no past there is little anticipation of the future.

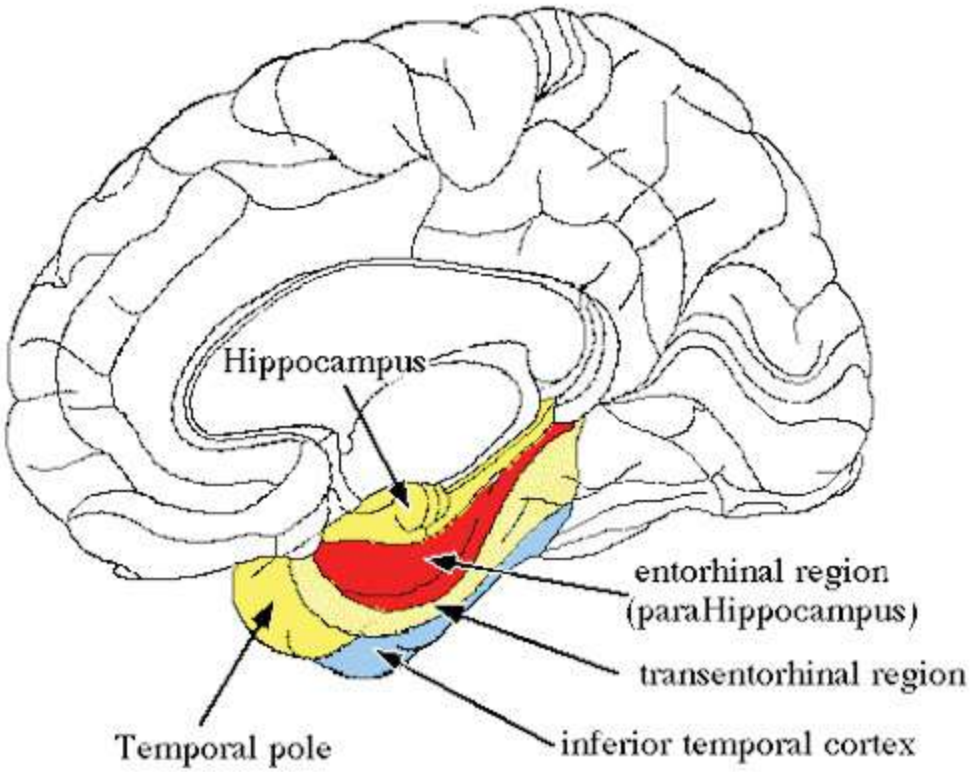

FRONTAL LOBE
PARIETAL LOBE
OCCIPITAL LOBE
TEMPORAL LOBE



The test cannot be carried out on the behaviors of severely damaged brains. People with severe brain damage have exaggerated experiences where fragments of normal behaviors are amplified to bizarre extremes. To conclude that God Experiences are a consequence of brain damage would contradict their functional significance, unless one assumes that brain damage has survival value.

Instead, a more subtle and reversible alteration in the temporal lobe's activity must be chosen. Aberrant electrical activity deep within the temporal lobe is one candidate. God Experiences do not occur all the time, at least in most of us. They occur in short bursts during periods of personal crisis, following ingestions of chemicals, or after certain rituals (such as prayer) have been followed.

Although electrical changes reflect alterations in the functional structure of the brain, they may not always be permanent. Some electrical changes reflect the intrinsic cluster properties of the millions of neurons involved. The degree to which these neurons are likely to maintain any electrical instability, however, is related to their location and to the alteration of appropriate neuronal chemicals. They are called transmitters and form the effective communication between the brain cells.



When electrical criteria are considered, the temporal lobe maintains a unique position among neural tissues. Hippocampal cells, in particular, display more electrical instability than any other portion of the brain. These cells are also prone to repeated firing long after the stimulation has been removed. The usefulness of this sensitivity can be seen in its function. Since the hippocampus is so important for the consolidation of experience (what we call memory), a sensitivity for the variety of complex and subtle inputs to the eyes, ears, and visceral senses is critical. As we search our complex environment, it must be given not only structure but meaning.

Electrical lability leads to unique properties. The amygdala and the hippocampus can learn specific electrical patterns. Like the total person learning to drive a car or to play tennis, specific kinds of electrical activity can be slowly acquired by these structures. This means that the experiences associated with those electrical patterns can come under the control of a place (like a church) a time (like crisis), or even more mundane, a person. Learned electrical changes within the brain are integrated within the intrinsic patterns of activity. Different regions of the brain show particular patterns that more

or less reflect structure and function. The temporal lobe is no exception. One of the most frequent electrical patterns generated from this lobe is called theta activity.

Theta activity, which has been defined as slow, synchronous or slightly spiked waves with frequencies between 4 Hz and 7 Hz (cycles per second) is associated with alterations in temporal lobe function. These waves occur during dreaming, creative thinking, and twilight states. This activity is present when you hear your name called just before you fall asleep. It is active when you close your eyes and repeat some thought, prayer, or mantra until only pleasant floating sensations remains.

Most of the time, the electrical activity of the temporal lobe is not exceptional. During thinking and experiencing, billions of neurons within the region maintain a complex field of electromagnetic patterns. There are few experiences of god, few episodes of intense meaning, and little sense of cosmic serenity. But, as we all know, there are brief periods, such as those occurring late at night, when the threshold of the God Experiences can be approached. Sometimes, in the early morning hours as we concentrate on some meaningful task, the sense of solitude blends into an odd feeling of familiarity. We begin to experience thoughts as if they have occurred before. A presence is sensed but not seen. There are times when the complexities of the world bear too much upon us. The job, the family, and the six o'clock news wear away our thin veneer of invulnerability. Just as life appears futile, we suddenly experience a sense of understanding and feeling of knowing. The next morning we can move again, forgetting, sometimes with shame, the convictions of the night before.

There are periods in each of our lives when we begin to know our dreams will never be acknowledged. As we pass from the third into the fourth decade of life, the youthful exuberance of infinite possibilities fragments into a cold reality of the mediocre. And then we hear a voice call us and we call it God. The next day, renewed and refreshed, we begin again.

These experiences should be correlated with normal, transient perturbations of the human temporal lobe. For now, they will be called temporal lobe transients. When they occur, the innate feelings of the God Experience are displayed. Depending on the extent of the activity, some experiences would be mild cosmic highs, the kind we feel in the early morning hours when a hidden truth becomes sudden knowledge. Other more

intense transients would evoke the peak experiences of a life and determine it thereafter. They would involve religious conversions, rededications, and personal communications with God.

The first time I recorded an inconspicuous electrical seizure form the temporal lobe of a meditator and heard the reports of cosmic bliss, I was impressed with the impact of this change on the person's behavior. Here sat a person waiting with anticipation for the coming of a few short seconds of seizure. There were no convulsions or head movements of any kind, just a slight smile and the facial expressions of cosmic serenity.

But the experience was compelling. The individual, depressed and forlorn before the episode, left with a fresh view of the world. For a few brief seconds, the person had mingled with the Great

Mentality whose rudiments are found in every human culture. The person had experienced a conviction shared by millions of other individuals. These people are not "weirdoes" or diagnosed abnormals. They are average people who interact in everyday ways with other people. They cope with their jobs, talk to their children, and carry on complex conversations. Some of them are the leaders of the scientific, artistic, and political worlds.

I never had the heart to tell that first person about the electrical recordings. In fact, the realization that the God Experience could be an artifact of the human brain was intellectually paralyzing. But since then, like hundreds of other brain scientists who have been determined to separate semantics from science, I have observed the symptoms again and again. They can be seen at the peak of prayer, when people revel in spiritual transcendence. They can seen during revivals when the sound of emotional hymns bring tears and smiles and the sense of a lifted burden. Wherever the world falls apart or loved ones die, the patterns appear.

The power of the God Experience shames any known therapy. With a single burst in the temporal lobe, people find structure and meaning in seconds. With it comes the personal conviction of truth and the sense of self-selection. How many people have died, still smiling, on arena floors and battlefields, in anticipation of another single burst of activity? The last question does not stem from cynicism but from concern. If the God Experience can control the lives of human beings to this extreme, what if it is can be controlled or manipulated by things or people? If the God Experience is a biological artifact of the human brain, no amount of consoling words

from ancient scriptures will alter that potential. The only difference between old works and modern books is the age of the paper.

That the temporal transients exist within all of us has not been proven (yet); however, it can be inferred. If temporal lobe transients are like any other phenomena, they should be distributed along a statistical continuum. Most of us should have small ones, once or twice a year, while a few of use should have them more frequently. A small percentage should show intense and extreme bouts of temporal lobe transients. Such a population exists; they have been called temporal lobe epileptics.

There is nothing unusual about studying the exception in order to find the rule. By studying people with problems in the frontal lobes, neuroscientists determined the correlates of thinking, abstracting, and planning for the future. By studying the people with peculiar parietal regions, researchers revealed how the awareness of the body image is learned. We have gleaned a great deal about the great ravelled knot by noting its occasional deviations.

Temporal lobe epilepsy is a special form of epileptic disorder. Unlike the more publicized types of petit mal (when the person blacks out for a brief period) or grand mal seizure (when the person has a “fit”), temporal lobe epilepsy is not necessarily associated with convulsions. To state that temporal lobe epilepsy is a disease with distinct symptoms, like measles or even influenza, would be inappropriate. Since the primary reason for the diagnosis is unusual electrical activity in the (usually anterior) temporal lobe, there is much over inclusion. The different potential abnormalities within this volume of brain space produces a multitude of interactions.

However, the most persistent characteristic of the temporal lobe is the “psychic seizure” without accompanying convulsions. Psychic seizure, which is a relatively poor diagnostic label (and should not be confused with psychic research), refers to the experiences associated with abnormal electrical activity within the temporal lobe. People with seizures in this part of the brain experience vivid landscapes or perceive forms of living things. Some of these entities are not human, but are described as little men, glowing forms, or bright, shining sources (vision), or an intense feeling, reflects the area of electrical instability. If the focus of the electrical activity is near a portion of the temporal lobe (like the uncus) associated with smell, then the experience may be olfactory. If the area of abnormal activity is nearer the auditory projection area, then the experiences may involve sounds or voices.

The experiences, whether visual or auditory, may have actually happened or they may be mixtures of fantasy and reality. Sometimes they may be fixed space and time, while in other cases they may be as dynamic as everyday experiences. However, whether they are dreamlike or as vivid as this book in front of you, they are experienced as real.

There are a number of changes that occur during psychic seizures that reflect the functions of the temporal lobe. The person may experience a sense of altered meaning. Sometimes there may be an enhanced sense of familiarity (deja vu) with events that have never been experienced. At other times, the opposite, an enhanced sense of strangeness to well-known conditions, may occur.

The sense of meaningfulness is like conviction. During a psychic seizure, intense and profound feeling may occur. Afterwards the person may not remember the details, but be convinced that it happened. The event, although vague, is packed with personal and profound significance.

Another characteristic of this abnormality is an alteration in the description of the self. Depersonalization is typical. In this state, the person feels unreal or simply “not there”. The body may appear to be in one place while the mind is in another. Depending upon the person’s learning, these experiences range from the heavenly to the exotic.

Frequently coupled to these symptoms is the experience of forced thinking. As the appropriate region of the temporal lobe displays abnormal electrical activity, repeated thoughts are experienced. They may be a phrase or a slogan or just a nonsense sequence. Again and again, they occur in a fixed stereotyped manner. Perceptual alterations are usually limited to the sudden expansion of visual and auditory images. Objects in the room may suddenly appear to grow very small and then increase in size again. Sounds may fluctuate from very faint and distant to very loud and near.

Patients with temporal lobe epilepsy or complex partial seizures are known to experience terror and incapacitating anxiety. Yet other times, they feel euphoric and happy within the enthusiastic sensation of unlimited possibilities. Irritability can lead to homicidal impulses, while depression precededes suicidal contemplation. These symptoms may not be associated with convulsions.

The coupling between temporal lobe disorders and religious experiences can be traced into antiquity. Shorn of their poetic language, the descriptions

of most religious leaders indicated temporal lobe abnormalities. If they were alive today, they would have much less appeal. There appears to be something magical about psychiatric symptoms when they are centuries old.

When we resist our reflex tendency to accept the received gospel merely because it is written, the Joan of Arcs of our past are cast in another light. There now appears to be good reason why they heard voices and then felt weak and incapacitated. There are clear mechanisms that explain why their sexual impulses waned when the euphoria of the cosmic high appeared. There is an explanation for seeing visions of things to come that never really came.

Now I am not saying that the experiences of God are synonymous with temporal lobe epilepsy. The experiences of the temporal lobe epileptic are exaggerated and disorganized forms of the brain's activity. When vast depolarizing waves spread across millions of cells, all types of memories and fantasies are mixed and mashed together. If the spreading is severe enough, even convulsions or "fits" may occur.

Instead, the God Experience is a normal and more organized pattern of temporal lobe activity. These short temporal lobe transients are precipitated by subtle psychological factors such as personal stress, loss of a loved one, and the dilemma of anticipated death. There are no convulsions and few bizarre behaviors.

When these small changes occur, they are experienced in an organized and balanced fashion. The experiences are primarily pleasurable and sublime characteristics of less severe forms of electrical activity. Only in more extreme conditions do fear and a sense of cosmic helplessness emerge.But the potential is not all-or-none. By virtue of brain function, there is a continuum along which all of us will fall. Every one of the more than four billion brains that compose the human species would be distributed along this scale. Most of us, by definition, fall in the middle. Temporal lobe epileptics merely fall at one end of the continuum. They display the types of behaviors experienced by all of us, except they are more fragmented. Most of the time, the components—the fear or the sublime, the cosmic communion or the eternal helplessness-are distorted out of proportion or hidden within the confusion of the seizure. However, the essential symptoms are seen in a milder manner within every type of religious experience that has been reported. The sense of profound knowing is experienced as "being touched

by God" or "being at one with the universe." The depersonalization is reported as "soul travelling" or "an insight into the streets of heaven." Forced thinking is experienced as being "implanted with the words of God." A simple epileptic aura is experienced as the distant sound of heavenly choirs.

These patterns are clearer within behaviors of temporal lobe patients between apparent seizures. During these periods, the brains of these people are most similar to the brains of average people during the peaks of frustration, stress, and personal crisis. It is during these times that the religious themes of thought and God Experiences should be and are evident. In fact, the behaviors of the temporal lobe epileptics have been characterized by the persistent theme of religiosity. Their lives are full of repeated peaks of mystical experiences and multiple conversions. They are obsessed by moral issues and the experiences of God and fulfilment.

Not surprisingly, their behaviors and psychological experiences are predominated by a sense of personal destiny, the most supreme form of infantile egoism. Each one has been selected to give a message to the world. Like the committed preacher or the proselytizing prophet, they have a sense of the special—their experiences are somehow exceptional. Whether prone to the ups of mania or the deep downs of depression, they are characterized by philosophical themes. Where did they come from? How were they born? Will they be reborn? Will they live forever? Sometimes the theme may be blatantly atheistic, but again and again they talk about the God Experience. Indeed, there is something about the temporal lobe and religious experience that cannot be refuted. There's the experience of time and the implication of eternity. There's the experience of space and the implication of infinity. There's the feeling of the intense meaning of the beginning and the end of it all.

If the data are clear, why haven't the patterns been evident? The relationship has been obscured by the source, the temporal lobe epileptic. First, most individuals who are hospitalized have other complications. The experiences they report are related to the nature of the more progressive disease processes. Second, when the God Experiences do occur, they are not reported. Personal God Experiences, because of the profound implication for the person's destiny, are not mentioned, lest they be misconstrued. People have been taught to assume that images of their late Uncle Henry in a rocking chair, smoking a cigar, are hallucinations; but the experience of God is real.

There is a way around the secrecy. Inhibition of ideas and actions are less evident within psychotic populations. Psychotic people, who are frequently called “just crazy”, fail to inhibit their impulses. They cannot relate in a predictable fashion to the world around them, nor can they cope in any socially acceptable manner within the confusion and complexity of change.

If temporal lobe disorders were associated with religiosity and the God Experience, then the temporal lobe psychotic should be a population inundated with these experiences. The data indicate this obsession. As reported by Slater and Beard in 1963: “Mystical delusional experiences are remarkably common. One patient said that God, or an electrical power was making him do things; that he was the Son of God. Another said he felt God working a miracle on him. Another felt that God and the Devil were fighting within him and that God was winning. Another claimed, ‘All this goes into one vast electronic brain which give God the power to give you life and individuality.

Hallucinations were often extremely complex and were usually full of meaning, often of a mystical type. Nearly always there were auditory hallucinations at the same time. One patient saw God, heard voices and music and received a message that he was going to heaven. Another had a vision of Christ on the cross in the sky, and heard the voice of God saying ‘You will be healed, your tears have been seen’.” Indeed, these reports are from hospitalized people. But does that change the impact of their experiences? Psychotic individuals are not psychological lepers or inhuman creatures. Their difference from normal people is only one of degree (and this is arbitrary). The same behaviors they display every day, we display once or twice in 20 years. Most of us have learned to compartmentalize the God Experience. It can be conditioned to occur in specific places or during certain times. Because of the relationship between the frontal and the temporal poles, most of us can learn to inhibitto control-its occurrence. Only in the psychotic does it run rampant.

Certainly, I am not the first neuroscientist to suggest the connection. Many others have seen it before. Most have denied it. A few, frightened by the implications, have pushed it into the corners of institutions. There it stayed, pigeonholed, as an abnormal mental event that is never outwardly manifested. I also suspect that some practitioners even guard it, as if its escape would bring global havoc.

Neuroscientists are, after all, human beings with fears of personal extinction and desires for immor-tality.

24. BrainMind Implications for Religious Beliefs and the God Experience

by Michael A. Persinger
Professor of Behavioral Neuroscience, Depts. of Psychology and Biology, Laurentian University, Sudbury, Ontario, Canada

The application of weak, complex magnetic fields through the cerebral hemispheres elicits experiences of a “sensed presence or “Sentient Being” in normal people. We have hypothesized these experiences are the awareness of the right hemispheric equivalent of the left hemispheric sense of self and may be the prototype for the god experience. Experimental results and clinical measurements have supported this contention. Challenge of religious beliefs, which display many of the characteristics of delusions, may be prevented by the natural characteristics of neurocognitive functions. Because the structures and patterns of activity involved with the god experience may also be associated with aggression, the observation that about 50% of males who have had a religious experience, attend church regularly, and display elevated frequencies of temporal lobe signs would kill in god’s name may have profound implications for the future of our species.

INTRODUCTION

One of the fundamental principles of behavioral neuroscience is that all

experiences are generated by or correlated with brain activity. This activity is determined by the microstructures within the brain and the patterns of electromagnetic and chemical activity within and between these structures. Structure dictates function and microstructure dictates microfunction.

There are several important extensions of these principles. The first is that all experiences are responses that must be evoked by physical events or stimuli. However the events that function as stimuli are only an extremely small subset of the myriad of events within the environment. Different information within the brain emerges from the varied organization of these experiences.

The principles indicate that all experiences, from the awareness of the sense of self, to the feelings of love, to the presence of God, emerge from brain activity. If the scientist can isolate the controlling stimuli that evoke an experience, then any experience, including the experience of God, should be subject to experimental verification and reproduction within the laboratory.

In 1983 during a routine electroencephalographic (EEG) study to monitor the effects of transcendental meditation, an experienced instructor of that technique displayed an electrical anomaly over her right temporal lobe. During this "electrical seizure," she reported she was "filled with the spirit" and she felt the presence of God with her in the laboratory. The duration of this electrical transient was about 20 sec (Figure 91).

The obvious question emerged. If one could extract from the brain the essential electromagnetic structure with which the experience of God is correlated and then re-apply this pattern to the person's brain without their knowledge, would that person experience God? Although clinical records of individuals who were diagnosed as complex partial epileptics with a focus within the right limbic or temporal lobe abounded with references to mystical and god experiences, the technology at that time was not available to design an experiment to test that hypothesis.

THE SEARCH FOR THE SELF LEADS TO THE SENSED PRESENCE

One of the last remaining challenges to modern neuroscience is to understand the neural bases to the sense of self. It appears to be associated with the linguistic processes often attributed to classical functions of the left hemisphere of the cerebrum. From a species perspective the propensity for

people to fight and to die to maintain their culture and their language is not surprising. Without the language process there would probably not be the human sense of self.

During the late 1980s the Laurentian University Neuroscience Research Group was interested in the cerebral bases to creativity and insight. Many of the great thinkers of human history, from scientists to the initiators of spiritual traditions, had reported that their "insights" were associated with feeling of communion with some force that was greater than their own sense of self. The information that suddenly occurred during these insights was often beyond the knowledge of the person if only the content of his reinforcement history was considered.

To study this problem we developed a computer based technology for the application of weak (10 nanoTesla to 1 microTesla), complex magnetic fields through the cerebral hemispheres. The basic procedure involved subjects sitting in a quiet chamber while blind-folded. The rationale for this approach was to imitate the historical conditions in which many "inspirational insights" have been be experienced. Attenuation of the auditory and visual inputs would also allow the activity of neurons that are typically involved with passive surveillance of the environment to become recruited into the cerebral patterns associated with the applications of the experimental magnetic fields.

Most people reported a "sensed presence" of a Sentient Being. The interpretation of the "presence" was a function of: 1) the person's temporal lobe sensitivity that can be inferred by both electroencephalographic activity and self reports from questionnaire), 2) the available cultural attributions or beliefs for the experience, and, c) the shape of the magnetic fields. The experiences were emotional and personally significant. The reconstructions of these ephemeral experiences as a component of autobiographical memory are strongly influenced by the explanation the person attached to the experiences within a few seconds of their occurrence.

Our working hypothesis is that the sensed presence is the prototype of the God experience and is actually the transient awareness of the right hemispheric equivalent of the left hemispheric sense of self. Intrinsic complex electromagnetic patterns within the left hemisphere that generate the sense of self are experienced as "the other" when their right hemispheric equivalents intrude into awareness. Because of the reciprocal inhibition of activity between the two hemispheres, these periods of intense "intercalation"

are infrequent for the normal brain, except perhaps during dreaming. However during periods of personal distress, psychological depression, certain psychotropic conditions, and meditation states these intrusions become more probable.

One would expect that the characteristics of the experiences would reflect the properties associated with the right hemisphere. For example the experiences would be profoundly emotional, spatial, "beyond the self", and meaningful. Our electroencephalographic measures in conjunction with the themes of these experiences indicated they involved the temporoparietal cortices and their limbic inputs from the amygdala (associated with cosmic meaning) and the hippocampus (the initial gateway to the cerebral representation of experience, i.e. complex memory). The most common correlates of the "sensed presence" include the experiences of "vibrations within the body", dreamlike states, detachment of the self from the body, spinning, and either fear, aggression, or sexual arousal.

For example, a 21 year old woman with a history of diabetes who was exposed to a burst-firing magnetic field reported "I felt a presence behind me and then along the left side. When I tried to focus on its position the presence moved; every time I tried to sense where it was, it would move around. When it moved to the right side I experienced a deep sense of security like I had not experienced before. I started to cry when I felt is slowly fading away" (We had shifted the field parameters). From a physical perspective, one might expect that changes in the patterns of intracortical activity associated with the act of "focusing upon the position of the presence" would have been associated with an alteration in the neuroelectromagnetic patterns. Consequently the applied fields would have interacted with these mildly different patterns and hence the ongoing experiences and their attributions would have been modified as well.

Different patterns produce variations of the experience. For example a 30 year old woman who received a frequency-modulated field (3 msec durations for each point that generated the field) over the right temporoparietal region reported (as an ongoing narrative), " I feel detached from my body..

I am floating up.. there is a kind of vibration moving through my sternum.. there are odd lights or faces along my left side. My body is becoming very hot.. tingling sensations in my chest and stomach..now both arms. There's something feeling my ovaries. I can feel my left foot jerk. I feel

there is someone in the room behind me. The vibrations are very strong now and I can look down and see myself".

We have been impressed by the common neurophenomenological themes of the experiences reported by the hundreds of university students and special populations (including visiting journalists) we have tested during the last 15 years. Although in general older people, individuals who are artists, musicians, or writers, and women are more effective introspectionists, the themes associated with specific patterns of fields have remained consistent. Each experience however, has its own special signature that is likely to reflect the beliefs of the experient as well as the cultural labels.

For example, a 25 year old male who received the frequency-modulated pattern over both hemispheres with each point in the field being presented for only 1 msec reported (post session interview) "I felt as if there were a bright white light in front of me. I saw a black spot that became a kind of funnel..no tunnel that I felt drawn into..I felt moving, like spinning forward through it. I began to feel the presence of people, but I could not see them; they were along my sides. They were colourless, grey looking people. I know I was in the chamber but it was very real. I suddenly felt intense fear and felt ice cold."

The application of the experimental complex, magnetic fields over the right hemisphere within the laboratory has consistently generated experiences of god or religious entities in people who believe in these experiences. For example a 50 year old man who reported he frequently feels Mother Mary or Christ during his daily life volunteered to participate. Without his knowledge for the timing of the presentations or the type of pattern, he reported (by button presses) the sudden "feeling" or the actual "visual presence" of Christ along his left side when a specific pattern was presented over his right temporoparietal region. The pattern imitated the pulse sequence known to produce long-term potentiation in hippocampal slices. Repeated presentations of this shape produced conspicuous but reversible reductions in the proportions of alpha rhythms measured over both occipital lobes and the right parietal region.

One of the questions that have been asked since we initiated this research is: What does an atheist experience within these contexts? We have exposed about 20 individuals, primarily experts in various disciplines who have visited the laboratory, who have identified themselves as atheists. They also

report a sensed presence or detachment from their bodies (out of body experience) but attribute the phenomena to their own cognitive processes. Often the experiences are compared to specific states induced by psychotropic compounds the person has sampled. These results strongly suggest that the experience of a "sentient presence" is an intrinsic property of the human brain and of human experience.

THE EXPERIMENTAL PROCEDURE AND TECHNOLOGY

Unlike the tradition in biophysics to study the effects of magnetic stimulation by employing the simplest of shapes of fields, we reasoned that complexity and information within these fields were more important than their intensity. If one wanted to study the function of the arrangement of molecules upon biological systems the selection of two molecules of hydrogen and one of water, because "its simple," would not have permitted the discovery of the unique properties of proteins or nucleic acids.

The importance of weak intensities of complexity and asymmetry more than high intensities of simplicity and symmetry for providing significant information to large collections of neurons is analogous to the importance of complexity for sound. If the reader was studying and a 1000 Hz sinewave sound occurred, then he or she would not respond unless the intensity began to exceed about 80 db when it would become irritating. However the complex mixtures of sound frequencies that produced the pattern "God is here" or "help me", at only 20 db (just barely at threshold) contain information. These temporally asymmetric and complex patterns, depending upon the context in which they occurred and the explanation given by the experient, would have powerful behavioral consequences that could last a life time.

We decided that the temporal shapes of these fields would be most effective if their structures simulated the natural patterns generated by neurons and aggregates of neurons. To imitate natural patterns we extracted the activity of neurons, clusters of neurons, and even large arrays of electroencephalographic measurements. The specific complexities of these patterns were converted into columns of numbers with each number displaying a value between 0 and 255. The number 127 was "0" while numbers above or below this value represented positive or negative polarities, respectively. These numbers were then converted into voltages by digital-to-analogue converters and then delivered through solenoids, arranged around a

person's head, to generate the magnetic fields.

The solenoids never touch the person's scalp to avoid any direct current induction or mechanical vibration. Instead the solenoids were embedded in a helmet, roughly at the level of the temporoparietal lobes for most individuals, within special containers that could be placed over more specific regions of the scalp, or in a type of "halo" device. In the latter geometry 8 solenoids are arranged equally in space around the scalp just above the ears. The electronic configuration of these devices allows the production of the complex magnetic fields to be generated through the brain from one hemisphere to another or to be rotated around the scalp.

There are four major parameters for these experimental magnetic fields. The first is the shape of the field itself. It is generated by the values in the column of numbers whose lengths range between 200 and 10,000 lines. The second parameter is the duration in real time of each number (and hence voltage) as it is read by the computer software. The brains of rats and humans appear to be most responsive to point-durations of between 1 msec and 3 msec. This means that if a pattern contains 1000 points and each point's duration is 3 msec, the duration of the electromagnetic pattern is 3000 msec or 3 sec.

The third parameter is the inter-stimulus time. This is the "no field" time between the presentations. We have explored interstimulus intervals between 3 msec and 10 sec in order to elicit the strongest effects. Obviously the intervals vary depending upon the type of experience. For example a burst-firing pattern, designed after the discharge pattern of amygdaloid neurons during an electrical seizure, pulsed once every 4 sec for about 20 min results in experiences equivalent to 4 mg/kg of morphine. Continuous presentation of this particular field does not produce this level of analgesia.

The fourth parameter is the total duration of the presentation of each pattern. Most of our studies have limited exposure to between 5 min and 40 min for convenience and to help develop strategies for potential applications to traditional clinical settings. Whereas repetition of the same pattern is more likely to evoke simple experiences within about 2 min, the sequential presentation of different patterns presented for about 2 to 5 min each appears to be sufficient to produce electroencephalographic entrainment and more experiences with varied themes.

We have employed three different procedures to measure the experiences

associated with the application of the computer-generated weak magnetic fields. The first technique involves the recording of the ongoing narrative of experiences. Its advantage is the immediacy of the report and the direct access to the experient's own words that can later be analyzed for emotional meaning and text composition. However ongoing narratives sometimes interfere with the experiences.

The second technique has been to give the person an exit questionnaire after the experiment has been completed. The subject is required to rank the incidence of typical experiences reported within the setting. This technique does not require an ongoing narrative and, unlike the narrative

procedure, does not interfere with the ongoing experiences. Its disadvantages are that many fieldgenerated experiences are ephemeral and appear to dissipate within about 10 sec to 30 sec and the content of the post-experience questions could be incorporated into the reconstruction of the memory of the experience.

The third technique we have employed to study the "presence" is to instruct the subject to press one of two buttons to indicate when a presence occurred and on which side it was experienced. With this procedure the exact time of an experience can be recorded on the electroencephalographic record and the side of the experience can be determined without the disrupting consequences of talking into the lapel microphone. In addition this procedure allows the experimenter to expose the subject's brain to a large number of different patterns for brief periods in order to discern the latency of the responses. The disadvantage of this technique is the experimental expectation for the type of experience is set.

In all of our experiments neither the subject nor the experimenter, usually a graduate student or senior undergraduate (thesis) student, are aware of the expectations of the experiment. The subject is told that the experiment is concerned with relaxation and that weak magnetic fields may or may not be applied sometime during the experiment.Several experiments, involving about 100 subjects, showed that stimulation over the right hemisphere first by a continuous frequency modulated field for about 15 min followed by bilateral stimulation over the temporal-parietal lobes with a burst-firing field once every 3 or 4 sec, markedly facilitates the sensed presence. If the presence occurs during the right hemispheric stimulation, the experience appears to be along the left side and to be more emotional (or fearful). If the

experience does not occur until the bilateral stimulation, the location of the "being" is perceived to be more to the right or on both sides and to be pleasant, even spiritual. About 80% of volunteers exposed to this sequence report a presence. The reverse procedure (burst-firing first followed by frequency-modulation) is less effective. Only about 10% of people exposed to sham-fields report a sensed presence. Most of them show above average numbers of temporal lobe experiences as defined by a pre-experimental questionnaire.

The elicitation of the sensed presence is specific to the temporal properties of the applied magnetic fields. The results of exposing the same subjects to a number of different patterns with different parameters and in different orders are shown in Figure 97 (bottom). The most effective configuration was the frequency-modulated pattern with point-durations of 3 msec. Reversed presentation of this number file that composed the FM pattern was not as effective. Even a very complex-sequenced magnetic field composed of 40 different shapes (within which the frequency modulated field was embedded), was not as effective.

EXPERIENCES OUTSIDE OF THE LABORATORY

Analyses of the common variance for clusters of subjective experiences reported by about 1,500 students measured over the last 15 years have shown that the sensed presence loaded on the same factor as the report of "being visited late at night by a cosmic consciousness" or "being at one with the universe". We have called this shared source of variance the "Muse" factor. Agreements with items such as "I feel intense meaning from reading poetry and prose", "I feel my thoughts are important to write down", "I have vestibular experiences such as low frequency waves undulating through the body as I fall asleep", and, "I have heard my name called just before 'falling asleep'".

In addition we have assessed, as a component of our practice in neuropsychology, more than 500 patients who have sustained mechanical trauma to their bodies. Most of these patients did not experience a suspension of consciousness and did not exhibit any CT-verified brain injury. More than 50% of these patients report that a sensed presence began to occur after the injury. In every instance the patient who reported the sensed presence felt as if he or she was no longer the same person.

The sensed presences were so disturbing that most of these patients had not reported the experiences to their physicians or to their loved ones because they were concerned about being labelled as “crazy”. In general if the presence occurred primarily along the left side, the experience was considered negative. Apprehensions or sudden fears were frequent correlates. If the presence occurred primarily along the right side, the experience was considered either neutral or positive.

“Internal” verbal messages, such as thoughts from the presence or “just knowing” information were more common. The negative experiences were attributed in large part to ghosts or to cultural icons for “evil”, such as demons, devils, or other adversaries. The positive experiences were attributed to deceased loved ones, such as a husband, a parent, or a god. They were considered “good”. These experiences reduced the person’s anxiety substantially.

We have also found that the sensed presence whose attributions range from bereavement apparitions to visitations from Gods or Aliens, occurs more frequently between midnight and 06 hr local time and in particular between 02 hr and 04 hr local time. This peak is the same period in which the greatest proportion of overt displays of temporal lobe seizures were recorded during the late nineteenth century before the implementation of effective medications.

Increases in global geomagnetic activity have been correlated with increases in both the numbers of “apparitions” and visual sensed presences as well as the numbers of epileptic seizures originating from limbic sources. That the brain is responding to the specific pattern and intensity (greater than about 40 nT) of the daily average global geomagnetic perturbations has been verified by the production of seizures in epileptic rats exposed to experimentally generated magnetic fields that precisely duplicated the temporal structure of geomagnetic fields.

One of the likely neurochemical mechanisms by which increases in geomagnetic activity encourages electrical lability within the limbic system is the suppression of the nocturnal levels of melatonin. This serotonin-derivative, primarily synthesized within the pineal organ, has dampening effects upon hippocampal electrical activity. Decreases in melatonin levels have been correlated with periods when daily geomagnetic activity increases above 20 nT and have been evoked by the nocturnal application of

experimental magnetic fields with slightly larger strengths.

PERSONALITY CHANGES AND GOD EXPERIENCES

Some structures within the temporal lobe are well suited for initiating the changes in personality that follow the electrical transients associated with a god experience. Reactive synaptogenesis has been demonstrated in specific layers of the hippocampal formation in the brain of temporal lobe epileptics. Recently such reactive synaptogenesis, that contributes to electrical seizures within the limbic system, have been produced experimentally in rats.

Portions of the hippocampal formation are remarkably sensitive to brief periods of physical and chemical trauma. For example Sommer's section, or the CA1 region of the hippocampus, exhibits neuronal loss or reactive synaptogenesis following periods of hypoxia, maintained levels of the epileptogenic neuropeptides such as CRF (corticotrophin releasing factor), and insufficient blood supply. The unusual vasculature of portions of the hippocampal formation increases its vulnerability to marginal ischemic insufficiency. When one considers that the majority of the normal geriatric population exhibits electroencephalographic spikes or sharp transients focally over the temporal lobes, then one might appreciate the propensity for older individuals to report more religious experiences.

Sudden, unexpected, traumas to the brain can also initiate this sequence. Near-death experiences, that are often associated with marked insufficiency of either oxygen or glucose to portions of the limbic system, are followed by changes in the person's personality. Increased emphasis upon spirituality and even a decrease in thantophobia and existential anxiety are typical.

The changes in personality following intermittent neuroelectrical discharges within the structures of the temporal and limbic lobes have been described succinctly by Bear and Fedio for temporal lobe epileptic patients. More than 40 years ago Slater and Beard described a subpopulation of epileptic patients who maintained their cognitive capacity as well as their ability to interact with people. The patients reported intense religious experiences, often with vivid visual hallucinations, and profound beliefs.

Our measurements for both clinical patients who sustain brain traumas that affect functions of the temporal lobes and people who have experienced "temporal lobe transients", the mechanism we have proposed is associated with an intense god experience, strongly agree with the observations of other

researchers. The immediate effects of a "god experience" involve intense dream-like experiences, prominent vestibular sensations ("lifting", feeling "free of burdens"), experiences of hearing-knowing information, and intense personal meaningfulness.

The after-effects of these experiences can be associated with confusion, disorientation, time loss, partial amnesia, and the incorporation of post-episodic information into the reconstruction of autobiographical memory. Typically a person whose is emotionally significant to the experient and to whom the experient has confided the experience will provide a label. The most common explanation is "you were called by god". The specific name, Yahweh, Allah, Jehovah, or the Great Cosmic Source, varies with the culture.

Ultimately personality changes emerge. There are bouts of automatic behavior and a sense of the personal. Events are perceived to occur because the person was "selected". A widening of affect encourages the person to infer patterns of meaning between unrelated experiences. Viscosity becomes more prominent and the person becomes fixed on specific ideas or phrases. In many individuals there is emphasis upon intuition rather than data or analytical deduction. An emergent focus upon nascent philosophical interests and the compulsion to record ones thoughts and feelings become more probable.

Finally, the person, because he or she feels "cosmic consent" is compelled to proselytize, to "spread the word". The person's social interactions are modified as he or she interacts more frequently with people who share the same belief and aspirations. The person is described as "a different" or "born again". Despite all of these changes the person exhibits normal social behavior without any loss in cognitive capacity.

HISTORICAL EXAMPLES

The histories of individuals around whom many religions have evolved strongly suggest marked enhancements of temporal lobe functions. The god experiences occurred in caves (Mohammed), during walks in the wilderness (Christ) or during imposed sensory deprivations (Buddha). Each of these human beings was convinced he had accessed the cosmic significance of the universe. Each of these experients of their own temporal lobe functions began religious movements that affected the development of human civilizations.

During the fifteenth century Guru Nanak, an unemployed musician, departed for his typical bath in a local river and disappeared for three days. When he returned, he remained silent for a day and then said "there is neither Hindu nor Muslim. I shall follow god's path". From his experiences the tradition of Sikhism emerged. Today a similar case might be attributed to an "abduction" experience by aliens.

During the nineteenth century a young son of a minister, while walking in the forest, felt a presence. He began to experience information from a persistent presence. He felt compelled to record these inspirations from the "messenger of god". The Church of the Latter Day Saints was born.

There is no doubt that the experiences of God have been associated with the most profound feelings of human existence. As stated through one of his characters Dostoyevsky stated "The air is filled with a big noise and I thought that it had engulfed me. I have really touched God. He came into me, myself; yes, God exists I cried and I don't remember anything else. All of you healthy people can't imagine the happiness we epileptics feel during the second before our attack. I don't know if this felicity lasts for seconds, hours, or months, but believe me, for all the joys that life brings, I would not exchange this one.

However these experiences are not always harmless. In a case reported by Spratling from the nineteenth century, before the era of modern medications, the (temporal lobe) epileptic patient reported "God told me that in my next life I would be born C.H.S. and marry my last sweetheart, and be a millionaire, and that I would be a strong, hopeful, and powerful Christian millionaire. I feel God's voice in my left ear at night. I feel the Lord in my chest. I see stars in my eyes. I have seen Christ crucified. God told me I would never have any more fits. God told me to bite off a patient's ear. If God told me to do wrong, it feels as if I would do it.

BELIEF IN GOD AS A 'COGNITIVE VIRUS'

Cultures have often been defined as groups of people with shared expectancies. Expectancies are beliefs by which we organize our experiential worlds. Beliefs are cognitive structures that allow us to predict the future and to minimize the anxiety of the unknown. To many cognitive processes the unknown is analogous to the anticipation of terror and unimaginable fear.

The sentence "I will die" is perhaps the most powerful three words that

have maintained the god belief. It is the semantic equivalent of conditioned suppression or the conditioned emotional response. Human cultures have devised three strategies to diffuse this semantic time-bomb. It often explodes with the realization that the dissolution of the self: death, is irrevocably imminent.

The first strategy is to remove the anticipation of termination. Every culture has a word or concept that refers to some component of the infinite, omnipresent and omniscient. If something is infinite, there is no end. If there is no end there is no anxiety.

The semantic operation to associate the person with this concept requires language structures that define the self as a subset of the infinite. Phrases such as “I am child of God” or “I will live on with God” are effective anxiolytics if one assumes implicitly that God is eternal. The “self” does not die because it becomes a component of the eternal.

The face validity of the illusion that the self is more than the body appears to be derived from the perpetual dichotomy between private and public behaviours. The resulting “dualism” between “the mind” and “the body” fosters the concept of souls, minds and other phlogiston-like entities that are reified by the experient. Once this assumption has emotional significance, even mundane experiences such as the perceptions in dreams where the self is separate from the body and in dimensions other than where the person is sleeping, become “proofs” that the “self” is independent of the finite physiology of the body.

One critical component of any god belief is that it must never be refutable or testable. Consequently the concept is always defined implicitly as “nonphysical”, not measurable, and as the final default explanation when there are no apparent answers to questions. Faith, the religious variation of intense belief, is employed as proof of validity. The most typical retort to challenge is “prove god is not there”.

The scientific method cannot prove a negative. However this semantic limit is not a weakness. It can be considered an encouragement to consider infinite possibilities as long as they are or could be measurable. The existence of god cannot be refuted because of the nature of the definition. It does not prove god exists. If I told you that the universe was controlled by invisible, nonphysical pink elephants would you believe? Prove they are not there.

The second approach to the problem of “I will die” has been to indict the

validity of “I”. Many eastern philosophies assume that the “I” is a social fiction. It is only created by the language and expectations of the culture. Consequently the “true path” is found by minimizing the role of language and by focusing upon the essence that remains. The self is simply a component of the large Cosmic Whole. There is no end to the whole.

The third approach is to this problem is to remove the “will” and replace it with the present tense. This solution, more popular among atheists and existentialists, can minimize anxiety because the anticipatory component is markedly attenuated. An aversive stimulus being experienced has much less anxiety than one being anticipated.

From a Darwinian perspective, one might appreciate the maintenance of the temporal lobe experiences that promote the God belief. If there had not been survival value associated with both the experience and the belief of gods, these behaviours should have been selected against long ago. They should have been deleted from our genetic expression.

One speculation is that during the early stages of the development of the self, the powerful capacity to anticipate the future was also associated with the capacity to anticipate one’s own demise.

If some other process had not emerged to attenuate this anxiety, the fragile sense of human self would have been fragmented. The incapacitation of anxiety and existential terror would have dominated.

Today most people acquire one of these solutions to the issue of personal death during their childhood. These explanations are given by parents or caregivers during the necessary times when pets, grandparents or friends die. By inference, which even the infant brain can display, the anticipation of the self’s own demise emerges.

As the microstructure of the brain matures and the child progresses through the cognitive stages of development, this belief minimizes the anxiety. As maturation proceeds, the belief there is a god with whom the sense of self can never end remains embedded within each cognitive stage. By the time the organism achieves adulthood, with the faculties to question the validity and the utility of the god belief, it has become an intricate part of the cognitive structure defining the self. To challenge it or even to examine it could begin the unravelling of the person’s sense of self.

Our experimental work to explore why people avoid the question of the validity of the god belief indicates that the belief has many of the

characteristics of a delusion. As many clinicians acknowledge, directing the verbal behavior of delusional patients towards the logical conclusion that their beliefs are unreasonable or false is difficult. Within one or two logical steps from the conclusion that the delusion is false, the patient's cognitive process often stops or is diverted to some other topic.

To examine how people avoid the logical conclusion that a belief is not valid, we have been asking volunteers to respond as quickly as possible to a series of progressive statements presented for 5 sec each on a computer. The person must respond yes or no as quickly as possible. The items begin with the statement that the universe is composed of matter and energy and then gradually move towards the evolution of molecules and cells.

For demonstration, beginning with item 17, "The neuron is cell", the statements slowly shift towards the conclusion that would indict the validity of the god belief. The questions are: 18, "The brain is composed of neurons", 20 "Different interactions produce different behaviors", 21 "All perceptions occur within the brain", 22 "All experiences occur within the brain", 23 "Beliefs are composed of experiences". 24 "Most people believe in the existence of God", 25 "God if a belief", 26 "God is an experience within the brain", 27 "All experiences are produced by the brain", 28 "The experience of God is produced by the brain", 29 "God does not exist except within the brain".

We have noted that as volunteers (particularly the ones who belief in god and attend church frequently) begin to approach statement 29, beginning around statement 24, their response times slowly increase even after the grammar and length of the statements have been accommodated. If processes associated with the right hemisphere (such as the accuracy for words presented to the left ear during dichotic word processing) are monitored there is an increase in this activity during the items (26,27) that precedede the conclusion that god is simply generated within the brain.

These data indicate there are experimental procedures that might help elucidate the neuromechanisms by which the average person avoids or ignores the logical conclusion that their belief in god may not be valid. The approach also suggests that every time the god belief is evoked to minimize anxiety, the strength of the belief, like any operant response, is strengthened. Effectively the belief becomes a powerful cognitive anxiolytic and antidepressant for the challenges to the left hemispheric sense of self.

However there may be a negative component to this intellectual opiate. Suppose another group of people exists who embrace a different god? If another god exists then does your god loose its omnipotent power? What happens when the experiences attributed to this god indicate that he or she is the only one god and believers in any other deity are less than human and hence expendable? Suppose your personal immortality is threatened. Would you kill to preserve your immortality?

"I WOULD KILL IN GOD'S NAME"

Specific electrical anomalies within the limbic system, particularly the amygdala, can trigger aggression and killing. Any stimulus that changes the threshold for amygdaloid-hypothalamic activity, from specific smells to suppression of nocturnal melatonin by geomagnetic activity, can evoke the response.

The human species is one of the most aggressive species that has existed. We are the

Tyrannosaurus Rex of the mammals. As a species we have killed every animal form we have encountered, sometimes to extinction. As a species, our first response to discovery, from gunpowder to atomic fission, has been to kill the perceived enemy. We even kill each other. Since the year 1500, approximately 150 million human beings have died during armed conflicts between nations.

More cultures have been raped and razed in the names of Jehovah, Allah, or the Great Cosmic Guide than one can imagine. Although sociologists and historians often attribute these episodes to political or economic causes, the individuals who engaged in killing often reported they felt as if they had "god's consent." When personal immortality of the self is involved, fear of being killed in battle is trivial by comparison.

Although not every one might kill others if they believed that their god had condoned it, the proportion of individuals who report they would is disturbingly high. About 7% of first year university students enrolled in psychology classes reported "yes" to the statement "If God told me to kill I would in His Name." Post-inventory interviews indicated these responders were not randomly responding or engaging in frivolous activity. Whereas 10% of the population who said they would kill in God's name were males, only 5% were females. Twenty-five (25%) of the males who frequently

attended a church, synagogue, mosque, or other religious context reported they would kill while only 9% of women who attended church frequently agreed with this item. For those males who attended church frequently, who reported they had a religious experience, and who displayed elevated temporal lobes signs, about 50% stated they would kill in God's name.

Close scrutiny of the personality profiles and psychological tests for these individuals indicated they were not pathological. The scores for the scales from the Minnesota Multiphasic Personality Inventory (MMPI), whose items are derived from psychiatric concepts of behavior, were within the average range or certainly not significantly different from people who reported they would not kill. The individuals who reported they would kill also did not differ with respect to suggestibility, proneness to imaginings, or self esteem. From a psychiatric and psychopathological perspective, these people were normal.

Most religious texts, including the Bible, the Koran, the Egyptian Book of the Dead, and the Book of Mormon, have frequent references to killing of others as proofs of gods' powers or justifications for their existence. People who do not belong to the same belief system are marginalized as unenlightened and become candidates for extinction. Nomad groups, believing themselves to the "chosen", have marched into lands belonging to others and have slaughtered entire peoples because "god gave us the land."To study how normal individuals might endorse ideas of killing others in the name of a god, we have selected passages from the major religious texts concerning those topics. To mask the sources and the historical syntax of these scriptures, the phrases are paraphrased and the name of the god has been replaced with "Alien." For example, one passage read "If you should die or be killed in the cause of the Alien, the Alien's forgiveness and mercy would be surely better than all of the riches. If you die or be killed you will be taken by the Alien into his midst." Another passage read "Those who rebel against the alien listen to the evil forces. They become an enemy of the Alien and all that is right. Therefore, the Alien has no place for them in his domain. If you die before you believe in the Alien you will become conscious of your own guilt. It will fill your Being with pain, anguish, and an unquenchable fire whose flame will last forever.

These items were given to university students under the title of "Clinical Rating Exercise". The student evaluators were asked "Read the following

comments of delusional patients about their reports of receiving special information during alien abductions. The specific name of the alien has been changed simply to alien. Your task is to determine which of these patients are most dangerous to society because of their beliefs about their mortality or definition of self with respect to dissolution of the self, i.e., death. Your job is to protect society from dangerous offenders." The evaluators were then asked to rate each comment from each "patient" (actually a scriptural source) on a Likert scale between 1 (not dangerous) and 7 (extremely dangerous).

The most conspicuous result from these studies is that university students who endorse extreme religious beliefs consider items about killing, such as the first example noted above, not to be dangerous to society. This association was evident regardless of the person's professed religious affiliation. These individuals also felt there was forbidden knowledge. They answered "yes" to items such as "There are things Science should not investigate" and "Belief in science and religion are not compatible".

It is interesting when these same items are quoted in the original and are referenced to the source, the ratings of the dangerousness is less (within the range of neutral). Whether this response bias reflects the political correctness of the contemporary culture concerning other's religion or some implicit assumption that religion can only be positive, remains to be investigated.

IMPLICATIONS

Our research, as well as the results of other experimenters, indicates that the experiences and beliefs about gods are normal properties of the human brain. In all probability they have developed within our species with other cognitive functions in order to facilitate adaptability. The primary role of the beliefs may have been to reduce anxiety about self-dissolution that, if not controlled, could have interfered with adaptation.

There is now experimental evidence that the experience of god can be simulated with the laboratory. Although we have shown general patterns of electromagnetic fields that can induce these experiences, it is likely that different people will require variations of parameters in order to optimize the experience. This technical variation would be analogous to the selection of the specific antidepressant and appropriate dosages for different patients.

Because the same brain structures and patterns that evoke the god experience are also associated with sexual behavior and aggression, god

experiences and beliefs could encourage aggression towards individuals who do not share these beliefs if the person experiences an “instruction” attributed to god. We are social animals that require social proximity and affiliation with groups. A component of this cohesion is the exclusion of others who do not belong, particularly when the validity of the belief that defines the group is threatened.

There are many stimuli, perhaps some yet to be discovered, that can evoke the experiences of God and foster religious beliefs. If the history of science predicts the future as it has explained the past, future discoveries will likely reveal phenomena that are even greater than the God experience and the God belief. Like the phlogiston of preconceptual chemistry or the concept of “epicycles” for Ptolemy’s explanation for the motions of planets, the current explanations for the experiences of the

Sentient Being as a Creator and assurance for personal immortality will no longer be required. Such changes are the nature of scientific discovery.

However there is now a potential technology that could be developed to enhance the experiences of “Sentient Beings” within large populations without their awareness. The patterns we have explored, extracted from natural stimuli, can be generated over significant distances. Like all technologies it can be employed for everyone or for the benefit of a few. This technology controls the prototypical experience for the belief of immortality. Understanding the neuroscience of god experiences and beliefs and how it can be provoked or prevented may be critical to the survival of our species.

by Matthew Alper

As a result of recent neurophysiological research, we now possess substantial physical evidence that there exist specific sites in the human brain responsible for generating religious and spiritual consciousness. More important, however, than the physical evidence that such sites exist, is how we choose to interpret this newfound data. Accordingly, we have but one of two choices to make. Either we are to interpret these findings from a religiously dogmatic perspective, or from a standpoint based on the scientific method.

In this regard, the question is quite simple: If we do indeed possess such "spiruality" engendering neurophysiological sites then either God must have put them there, or, like every other part of our anatomy, they evolved through the process of natural selection. If, it should turn out that God installed these sites withing us-perhaps as some type of "antennae" through which we might "receive" Him— then the case is closed and there is little else to investigate on the matter. If, however, these sites emerged through the process of natural selection, then we are presented with a mystery that demands to be solved. When, for instance, might these sites have evolved in us and, more importantly, why? As a distinct proponent of the evolutionary view, I believe it is important to try to piece together those events in human cognitive history that may have led to the emergence of this particular adapatation.

As the German philosopher Hegel succinctly expressed, "All that exists is rational" (Hegel, 1821). Every cause has its effect; every effect has its cause. In essence, nothing happens without a reason. Since this axiom applies to all that exists, it must also apply to all the various forms of terrestrial life as well-all forms including our own.

In applying this axiom to specific human characteristics, every trait we possess, from stereoscopic vision to our opposable thumbs, must have a specific reason for having emerged in us. Since the driving force underlying all evolutionary processes is the preservation of a species, every trait must somehow serve to increase our species' chances of survival. This is evident in every organ we possess (excluding, of course, those vestigial parts such as the caudal vertebrae or coccyx, that evolutionary memento of our predecessors' tails, or the appendix , a relic of our grass eating days, two

examples of anatomical parts which, because we no longer need them, are in the process of being selected out of us). Because all traits must perform a specific function that will serve to increase a species' survivability, if humans possess specific neurophysiological sites responsible for generating spiritual consciousness, then the same must hold true for these parts as well.

Consequently, if humans possess spiritual consciousness, we must ask: What might its purpose be? What function might such an adaptation serve that it could enhance our species' survivability? What is this trait's rationale, its reason for being? Again, as is true of all traits, if human spirituality didn't provide some very specific function, if it didn't somehow serve to enhance our species' survivability, it would never have emerged in us.

Most physical traits emerge in response to some environmental pressure. For instance, if Arctic wolves possess thick coats of fur, it's because their environment pressured them to evolve one. As our terrestrial environments are in a state of constant flux, we as organic matter, are constantly being forced to adapt to meet the demands of our ever changing conditions. Therefore, if humans possess a neurophysiologically-based spiritual function, we must not just seek to understand its purpose, but we must also seek to understand those environmental pressures that may have forced the selection of such an adaptation upon us.

In the aforementioned case of the Arctic wolves, it was the pressure incurred by the cold weather that caused their heavy coats of fur to emerge. Among our own species, what change might have occurred within our environment that may have prompted the evolution of a spiritual function in us?

Furthermore, what was unique about our species that we alone should have developed such a seemingly abstract trait? Given that Nature weeds out all that is superfluous, if spiritual consciousness didn't somehow enhance our species' survivability, it simply wouldn't exist.

AWARENESS OF DEATH

"In a hundred countries, in a thousand languages, humanity stops and reaches upward, keenly aware of its mortality." --(Matthiessen, 1991

"No thought exists in me which death has not carved with his chisel" --Michelangelo, as cited by Ramsden, 1963

No other creature on earth has the intellectual capacity of Homo sapiens.

As a matter of fact, our intelligence constitutes the foundation of our species' remarkable strength. Whereas fish can swim, birds can fly and cats have speed, humans possess an intelligence that has allowed us to venture deeper, fly higher and move faster than any other creature on earth. No other creature, besides the quasi-living viruses, comes close to challenging our dominion over the other forms of life. All we have to do is look around us to behold the awesome power of our intelligence. In the last hundred years alone, we have transformed this planet's surface more dramatically than any other species has in the last three billion.

Nevertheless, as much as our vast intelligence may have graced our species, it has also been the source of our greatest affliction. Though our intelligence may have made us the most versatile and therefore powerful creature on earth, this same adaptation has backfired on our species with nearly the same potency that it has served us. As a result of our intelligence, something happened that had never before occurred within the known universe. With the same powers of perception that allowed our predecessors to scrutinize the world around them, Homo sapiens developed the unique capacity to perceive their own selves. An organic form emerged that was aware of its own existence. No other creature before us had any idea that when it drank from the watering hole, the image it gazed down upon was that of its own reflection. Now, for the first time in life's three and a half billion year history, an organism suddenly could. For the first time, a combination of molecules had emerged that could comprehend its own existence. Imagine those primal humans looking down at their hands, their bodies, in awe of what they saw and for the first time, asking that fateful question, "What is this that I am? What is this that I exist?" With the capacity for this one cognition, this one self-reflection, the human species was transformed. In biblical terms, man had taken his first bite of the Forbidden Fruit from the Tree of Knowledge.

It was probably not long after this first cognitive lightning flash occurred that we were hit with the inevitable thunder: "If I am, if I exist, then isn't it possible that one day I might not?" With the same capacity with which humans could comprehend their own existence, we became equally aware of the possibility of our own non-existence...of death. With this one awareness, the wheels of life which had been turning so smoothly for all these billions of years had turned down a cognitive cul de sac. Humankind had suffered life's

first existential crisis.

THE PAIN FUNCTION

”Pain and death are a part of life. To reject them is to reject life itself” (Ellis, 1897-1928). According to Siddhartha, enlightenment can be attained by anyone willing to follow the path of the “Fourfold Truths” (Siddhartha, c. 525 BCE). The first of these truths, referred to as Dukkha, asserts that life is a process of universal misery and suffering. No matter who we are, be it prince or pauper, we are all destined to experience the same fateful demise. We are all bound to grow old, weak and infirm. We are all preordained to lose everything we ever had or loved, including our own selves. In a nutshell, we are all going to die. Borrowing from this tenet of Buddhist pessimism, Freud expressed a similar notion: “We are threatened with suffering from three directions: from our own body, which is doomed to decay and dissolution and which cannot even do without pain and anxiety as warning signals; from the external world, which may rage against us with overwhelming and merciless forces of destruction; and finally from our relations to other men” (Freud, 1962).

Because our lives are incessantly threatened by such perilous forces, pain represents not only a biological phenomenon but a biological necessity. Just as with every other trait we possess, we experience pain because it serves a very specific function. But what exactly is pain? Pain is a negative sensation experienced by organic forms when specific receptors are triggered in the brain. Stimuli that elicit pain are generally indicative of things that represent potential threats to an organism’s physical existence. For example, excessive heat, as in the form of fire, can harm, if not kill, a creature. It is for this reason that many animals possess heat-sensitive receptors that cover the surface of their skin. When these receptors come in contact with excessive heat, an animal experiences this potentially hazardous stimulus as a negative sensation we call pain. By experiencing excessive heat in such a negative or “painful” manner, animals are compelled to avoid that which can burn them. Should an animal get too close to a flame, the negative sensation of pain will prompt it to retreat, thus saving it from what may have caused more serious damage.

Pain therefore represents an evolutionary adaptation meant to encourage organic forms to avoid those things that may constitute a threat to their

existence. It is this pain function that keeps us evervigilant. It is what prevents us from being pierced by sharp objects, to burn, freeze, starve, or dehydrate.

To provide a more specific example of how this pain function operates, I'll use the example of hunger in a rabbit. In order to prevent a rabbit from starving to death, its undernourished body will send a distress signal to its brain that it is in need of sustenance. It is this negative sensation that will motivate the rabbit to seek its required fuel supply. If this physical need is not met within a certain time frame, the animal's body will reinforce this signal by stimulating even more pain receptors causing the rabbit's hunger to be intensified. What was previously experienced as a mild discomfort becomes an acute pain. In essence, the body is sending a distress signal to itself saying, "Feed me or die!" To relieve itself of the painful sensation of hunger the animal is motivated to seek sustenance.

In our own inaccurate language, when the rabbit finally finds and consumes its meal, we tend to say that it is experiencing pleasure or satisfaction. But if we look at this from a purely biological perspective, it is not pleasure that the animal is experiencing but rather the diminishment of its pain.

Just as the experience of pain increases an animal's survivability, it plays an equally important role in maintaining the preservation of a species.

It is the negative stimulus of sexual tension that incites animals to reproduce. Among mammals, reproduction represents a hindrance to individual survival as having to provide for offspring means an animal has that much less time to devote to securing its own personal needs. Giving birth and rearing young therefore is an obstacle to individual survival. Nevertheless, as reproduction plays an integral role in the preservation of any species, it is a necessity. It is for this reason that animals are biochemically driven to reproduction. Once again, though sex is generally perceived as something pleasurable, it more accurately represents the diminishment of sexual tension or pain.

Among the higher order social animals, most particularly among Homo sapiens, another example of a negative or painful stimulus that serves to promote the well being of the species involves that negative experience we refer to as loneliness. When one is alone, that is, isolated from the community, he is most vulnerable. As no individual is completely self-

sufficient, each of us must rely on the assistance, care and protection of others. On our own, we are most defenseless. Within the group, however, an individual gains the added security and strength that comes with increased numbers. It is for this reason that Nature selected us with a negative or painful stimulus that prompts individuals to pursue the company of others.

A related example of a negative stimulus that serves to promote the well-being of the individual, as well as its species, involves what we refer to as separation anxiety, a physical discomfort experienced when we are separated from a loved one. Because romantic love fosters procreation, security and effective child-rearing, it is necessary that we experience a discomfort when separated from our romantic partners. Consequently, though we perceive ourselves as joyous when reunited with a loved one from whom we've been separated, it is really the diminishment of our separation anxiety that we are experiencing. (A research team led by anthropologist Helen Fisher of Rutgers University has been working to isolate the chemistry involved in bonding behaviors. Fisher believes that attachments formed between two individuals "in love" are caused by changes within the brain involving a group of neurotransmitters called mono-amines, which include dopamine, norepinephrine, and serotonin. To plot these changes, Fisher subjected lovelorn couples to a functional magnetic resonance imaging or fMRI brain scanner that could pinpoint minute changes in blood flow in the brain associated with bonding and infatuation. What she found was that whereas lust is governed by testosterone and estrogen, attachment is governed by the neurotransmitters oxytocin and vasopressin. Apparently, even romantic love and attachment can be reduced to neurochemical processes.

This hypothesis was also confirmed when Andreas Bartles at University College London found that when students placed in an fMRI were shown photographs of loved ones, as opposed to photos of insignificant others, which had much less effect, specific regions of the brain became highly activated. The areas which lit up were part of the anterior cingulate cortex and the middle insula and parts of the putamen and caudate nucleus.)

In summary, it is pain that keeps organic forms alive and intact. Pain is Nature's electric prod that is incessantly goading us towards those things which benefit us and away from those which can do us harm. We therefore experience pain and discomfort for a reason. Pain represents the chief stimulus by which all life is prompted to survive.

THE ANXIETY FUNCTION

"Just as courage imperils life, fear protects it" (da Vinci 1452-1519, as cited by Richter, 1952). "There are times when fear is good. There is advantage in the wisdom won from pain." --Aeschylus,c. 458 BCE

Most particularly among the mammals, threatening circumstances elicit a particular type of pain we call anxiety. Anxiety constitutes a specific type of painful response meant to prompt animals to avoid potentially hazardous circumstances.

As the stomach is responsible for the digestion of food, its pain receptors respond to the quality of nourishment it receives. Analagously, as the brain is where all data is stored, it is responsive to the quality of information it receives. For example, a baby rabbit pokes its nose into a fire for the very first time. The excessive temperature stimulates heat receptors dispersed throughout the rabbit's skin. This negative stimulus incites the motor reflexes which prompt the rabbit to recoil from the flame. Having escaped the situation with no more than a superficial burn, the rabbit will now encode this experience in the form of a memory. From now on, whenever this rabbit perceives a fiery object, the memory of its encoded experience will be retrieved, thereby alerting it not to repeat its past action. Rather than having to experience being burned over and over again, the rabbit's memory will act as a buffer against all possible future experiences with objects that emit excessive heat.

Though this capacity to store and utilize memories enables the rabbit to avoid fire without having to be burned repeatedly, this does not mean that the memory itself is altogether pain free. In order to remind the rabbit of the potential threat that fire and excessive heat represent, the memory will elicit a type of discomfort we call anxiety. In this way, though anxiety may serve to protect the rabbit from incurring any actual physical injury, it, nevertheless, subjects it to a certain degree of discomfort. That an actual memory can cause one to experience psychological discomfort or anxiety demonstrates that memories store emotional as well as purely perceptual data. As a matter of fact, emotional memory can be attributed to the brain's amygdala, which, when damaged, will result in the loss of an individual's capacity to retrieve memories that contain emotional content (LeDoux, 1994).

With this advanced faculty to store memories, in conjunction with the capacity to experience anxiety, an organism no longer had to sustain actual physical injury before it was motivated to avoid a potentially hazardous experience. Anxiety therefore acts as an early warning device that keeps an organism ever alert to potential threats before one is actualized.

In another more extreme example of how anxiety serves us, imagine that the rabbit now wanders off only to find itself confronted with a mountain lion. The urgency of the situation causes the rabbit to experience the most painful symptoms of anxiety, all meant to incite it to escape an otherwise potentially hazardous circumstance. Some of the negative symptoms of anxiety include heart palpitations, muscle tension, hyperventilating, trembling, perspiration-all of which are meant to prompt the rabbit to get as far away from the source of its discomfort as quickly as possible. Consequently, even though the mountain lion has yet to lay a paw on the rabbit, the rabbit will still experience the pain of its own anxieties.

When an animal is confronted by such a mortal threat as this, the symptoms of anxiety can be extremely painful. Anxiety therefore serves as an advantageous adaptation in that it prompts the organism to respond to a potentially hazardous situation with greater speed and efficiency. Should our rabbit manage to escape the mountain lion, it will encode this anxiety-engendering experience in the form of a memory. The next time the rabbit leaves its lair, the anxiety-evoking memory of its past experience with a mountain lion will discourage it from going anywhere near one. Thanks to this anxiety function our rabbit no longer needs to be attacked by a mountain lion over and over again to know to avoid one. It is for this reason that anxiety represents a biological necessity.

As Ernest Becker, author of Denial of Death, wrote: “Animals, in order to survive have to be protected by fear responses, in relation not only to other animals but to nature itself. They had to see the real relationship of their limited powers to the dangerous world in which they were immersed. Reality and fear go together naturally (Becker,1973).

As the human brain is more complex than that of other species, our cognitive capacities are that much more sophisticated. First of all, our brains contain much more storage space dedicated to memories. Secondly our species possesses an enhanced capacity to comprehend various possible futures. As a result of the combined affects of these two capabilities, humans

are aware that hunger elicits pain, and enhanced by our capacity for foresight, we are motivated to procure food and shelter not just for today but for the future. Unlike many of our evolutionary ancestors who needed to rely on the immediate stimulus of hunger to be motivated to search for nourishment, we are compelled to make sure there is food available long before it is actually needed. This capacity for forethought grants us the added benefit of having more time to secure our most vital needs. Because a simplerorganism needs to rely on the immediate stimulus of hunger to be prompted to search for its food supply, it may only have a few days' advance notice to procure its next meal before it will starve. In the case of humans, however, as a result of our advanced capacity for foresight, we can erect entire structures whose sole purpose is to store food for years to come.

Though this capacity for foresight may work to our advantage, it comes with a serious drawback. Instead of just being anxious about those threats that exist in the present, we experience anxiety for all those possible threats which might jeopardize us in the future. Consequently, humans don't just experience anxiety over how they will procure their next meal but over how they will secure tomorrow's meals as well. And it's not just tomorrow's meals we're concerned with but all those we will ultimately need to sustain ourselves and our progeny far into the future. For this reason, though our capacity for foresight may serve to our advantage, it at the same time engenders a tremendous amount of anxiety.

In many ways, the anxiety function represents our primary defense in our incessant struggle for survival. It is this anxiety function that keeps us ever-vigilant and alert, always on guard against the potential threats, all the things we have the unique ability to secure ourselves against long before they represent an actual threat. It is this anxiety function that has motivated us to manufacture fire and electric light, to develop all sorts of medical technologies, to build dams, and structural fortifications, to erect silos, and to devise methods of refrigeration. Due to our enhanced capacity for planning combined with the anxiety induced by our fear of potential future threats, we are obsessed with our futures. It is necessary we be this way, for the minute we become lax and lower our guards, we become vulnerable to a world of potential hazards and predators. In essence, the moment we become less anxious, we become that much more endangered.

Whereas other animals may have claws or sharp teeth with which to

protect themselves, humans possess a capacity for foresight. With our enhanced capacity to envision alternative futures, humankind is that much more equipped to fortify itself against more threats than any other creature. Nevertheless, this type of advanced intelligence comes at a very high price.

WHEN AWARENESS OF DEATH MEETS THE ANXIETY FUNCTION

”Anxiety is the state in which a being is aware of its possible non-being...The anxiety of death is the most basic, most universal and inescapable” -Tillich, 1952.

“No one is free from the fear of death...The fear of death is always present in our mental functioning.” --Zilboorg, 1943.

”The deep realization of the frailty and impermanence of man as a biological creature is accompanied by an agonizing existential crisis.” --Grof, 1975.

“He that cuts off twenty years of life cuts off so many years of fearing death.” --Shakespeare, c. 1564-1616.

So what becomes of our anxiety function when it is confronted by our species’ unique awareness of death? How are we to effectively utilize our capacity for foresight when it is incessantly informing us that we are ultimately going to die? It is our capacity for foresight complemented by our anxiety function that keeps us perpetually vigilant, always on the lookout for any next possible threat. And though it is this same awareness that motivates us to avoid such perils, it, at the same time, brings us face to face with the fact that no matter what we do to fortify ourselves, our actions are all in vain. No matter how hard we work to provide ourselves with food and shelter, no matter what we do to protect and defend ourselves, no matter how much we plan and prepare for our futures, we know that death is inevitable and inescapable. It is this awareness that strips the anxiety function of all its efficacy, in turn, stripping humankind of its capacity to effectively survive.

No other creature on this planet can comprehend the concept of its own existence. Consequently, no other creature can conceive of its own non-existence, that is, of its own mortality or death. This coincides with the fact that no other creature can comprehend the concept of its own future. Before us, all creatures lived in and for the moment. If an animal got hungry, it sought food. If it got tired, it slept. It lived and it died without one conscious

thought regarding its own existence or non-existence.

It had no conceptual awareness of its own possible future and therefore of its own possible death. The question, “What might happen to me tomorrow?” had never before been asked until man conceived that such a day existed.

This time consciousness, which is possessed by no other species with such insistent clarity, enables man to draw upon past experience in the present and to plan for future contingencies. This faculty, however, has another effect: it causes man to be aware that he is subject to a process that brings change, aging, decay and ultimately death to all living things. Man, thus, knows what no other animal apparently knows about itself, namely that he is mortal. He can project himself mentally into the future and anticipate his own decease. Man’s burial customs grimly attest to his preoccupation with death from the very dawn of human culture in the Paleolithic age. Significantly, the burial of the dead is practiced by no other species. The menace of death is thus inextricably bound up with man’s consciousness of time (Encyclopedia Britannica, 1977).

To add insult to injury, not only are we aware that we must die, but we also know that death can come at any given moment. Regarding our futures, nothing is certain. We live our lives anxiously standing beneath the mythical sword of Damocles wondering when that single strand of hair that holds inevitable death suspended above our heads will finally snap.

Imagine how apparent this must have been for our earliest ancestors. How much security did primitive humans have that each day would not be their last? Imagine a time when there was hardly any medicine, when what may have seemed like a bellyache or toothache one day brought death the next. What constant dread and uncertainty must have plagued our ancestor’s existences. Among such nomadic dwellers, even the seemingly simple task of procuring one’s next meal represented a potentially mortal chore. Whereas today we can merely pull up to the nearest drive-through restaurant to obtain our daily ration of meat, these men had to go out with their crude hunting utensils and bludgeon some ferocious beast in order to procure their next meal. In such times, the threat of death was constant. And yet, with all of our modern conveniences and medical technologies, very little has really changed. Even with all of our advancements, there is still no escaping the fact that we are all destined to die as well as that death can occur at any moment. Sure we may live another twenty or thirty years longer than our predecessors,

but what difference does that really make when measured against all eternity?

Living with the certain knowledge of imminent death leaves us in a state of perpetual mortal crisis. At every moment, we stand face to face with a mountain lion from which there is no escape, staring straight into the jaws of death. What this means is that in light of our capacity for foresight, our awareness of inevitable death condemns us to live out our existences in a state of incessant mortal terror and dread.

The chief difference between our condition and that of the rabbit as it stands face to face with a mountain lion is that whereas the rabbit can escape the object of its fear, human beings cannot.

Once we developed a capacity to reflect upon our inevitable deaths, we were left a state of unremitting fear of an enemy that we can neither see, flee, nor defeat. In essence, we are no better off than if we were strapped with a time bomb on a random timer set to go off at any time within the next fifty or so odd years. What would we do in such a case other than to spend the rest of our lives in a state of constant terror and dread, waiting for the ticking bomb to finally detonate? How is the human condition any different from this? The threat of death lurks around every corner, in every breath, shadow, meal, and stranger. And though we don't know from whence or where it will come, we are condemned to recognize that it inevitably will.

In addition to this, as potent as our fear of personal death is the fear of losing those we love. As a social organism, we are dependent on others for our physical as well as emotional survival. Again and again, studies show the debilitating effects of isolation in humans. Without love, we are generally pained beings. (This was most effectively demonstrated by the pioneer work of Harry Harlow [1905– 1981], who raised young monkeys in varying degrees of isolation and found that those reared in solitary confinement grew to be utterly dysfunctional adults who, to compensate for their lack of contact, would often spend their days crouched in a corner, chewing on their own limbs as a means to provide themselves with some form of sensual stimulation.) For this reason, we place nearly the same—if not more—value on the lives of those to whom we are emotionally attached as we do our own. Consequently, we live in constant fear not just of losing our own lives but of losing the lives of those we cherish and love.

Just as there is no escape from death, there is no escape from the consequent anxiety that our mortal awareness imposes upon us. With the

advent of our awareness of death, humankind was left in a state of perpetual angst, what Soren Kierkegaard called “the sickness unto death” (Kierkegaard, 1849). With the dawn of self-conscious awareness, the anxiety function had been rendered impotent and, as a result, so was our species.

It is this breakdown of our anxiety function that makes human beings the dysfunctional animals we are. In our frivolous attempts to either oppose or escape unavoidable death, we channel our energies into a morbid array of self-destructive behaviors. In our futile efforts to oppose the unopposable, we have become the only animal that will needlessly kill one another as well as our own selves. Unlike any other creature on earth, we are capable of acts of suicide, genoicide, sadism, masochism, self-mutilation, drug abuse, along with a multitude of other disturbed responses, all of which result from our species’ unique capacity for self-conscious awareness and with it an awareness of death. As a result of our advanced capacity to comprehend the concept of our own deaths, humankind had become a psychologically unsound, or as Freud phrased it, “the ‘neurotic’ animal” (Freud, 1900 as cited by Eagleton, 1976).

Furthermore, in light of our awareness of inevitable death, life takes on a newfound sense of existential meaninglessness. Our struggles to survive become an exercise in futility. Between death’s inevitability and all of the suffering we are forced to endure, we are compelled to ask: Why go on living? What’s the point? How was our species to justify its continued existence in light of such a hopeless circumstance? Why struggle today when tomorrow we won’t even be here? Under such circumstance, the motivating principle of self-preservation that had sustained life for all these billions of years no longer applied to our species. This was a whole new set of rules our animal was now playing by, and unless something could be done to ameliorate our species’ pained and desperate state, it might not have been long before our newly evolved animal would have succumbed to the forces of extinction.

THE ADVENT OF THE SPIRITUAL FUNCTION

”Fear begets gods.” --Lucretius, c.99-55 BCE.

“In order to counter this fundamental angst, humans are ‘wired’ for God.”-Benson, 1996.

”If the brain evolved by natural selection, religious beliefs must have

arisen by the same mechanism," Wilson argues that "if the brain evolved by natural selection, even the capacities to select particular esthetic judgements and religious beliefs must have arisen by that same mechanistic process" (Wilson, 1975).

So there we were, a newly emerging species with an unparalleled intelligence, one which had made us the most powerful creature on earth. And then, just as everything seemed to be working just fine, the inevitable took place: Man's intelligence backfired on him. For the first time in the history of life, an organic form turned its powers of perception back upon its own self thus rendering it aware of its own existence. With the dawn of self-awareness, a cognitive revolution had taken place. With a newly emerged awareness of our own existence, the human animal had become equally aware of the possibility of its own non-existence. And so, with this one cognition, the most powerful creature on earth was suddenly incapacitated by a crippling awareness of its own inevitable death.

Imagine how these protohumans must have felt, suddenly cognizant of their own inevitable demise—naked, vulnerable, alone, defenseless against the threat of impending death, exposed before the void, unprotected by any "higher" force or being. If Nature didn't provide our newly emergent animal with some type of adaptation through which to counter the anxiety induced by this awareness, it's quite possible our species might not have endured. In order to compensate for this debilitating awareness, Nature was going have to modify our animal's cognitive capacities in such a way that we would be able to survive this unique awareness of death. Rather than being stricken by some devastating new viral or climatic threat, Humankind had been assailed by a new type of environmental pressure, one which just so happened to originate from within our own bodies, within our own brains (after all, don't our own bodies constitute our physical environments?). As a result of this new physiologically-based environmental pressure, it became necessary that further changes take place within us if the hominid line was to survive.

In order for us to conform to this new environmental pressure, the forces of selection could have affected our evolution in one of two ways. Essentially, our intelligence, which had served as our greatest strength, was now jeopardizing our very existence. One evolutionary strategy that Nature could have implemented would have been to weed out the more self-aware members of our group, thereby leaving a population of less mortally

conscious individuals to survive. In other words, the forces of natural selection could have simply pushed us back a few stages in our cognitive evolutions and returned us to our former, less self-consciously aware, less intelligent states. The problem with this solution, however, is that selfconscious awareness represents one of our most formidable intelligences. Because we are self-aware, we possess the unique capacity to adapt ourselves to any situation or environment. For example, should another ice age come, whereas any other animal would have to wait for millions of years of natural selection to provide them with a thicker coat of hair, humans can sew themselves one within a few hours time. Because we are aware of our own selves, we are aware of our own limitations and can therefore adapt ourselves to survive most any circumstance. Because we can create tools and technologies through which to compensate for our physical shortcomings, we have become the most resilient creature on earth. Without that intelligence, we are of the weakest and most vulnerable.

So there we were, the naked ape, hiding out under rocks or in caves; without claws, fangs, wings, or venomous sting or discharge—nothing save our vast intelligence. Had this been taken from us, how would we have protected ourselves from the other species? Without our intelligence, Man is like a walking meal just waiting to be eaten.

Such a strategy probably wouldn't have worked in our favor. Instead, some new adaptation was needed that would allow our species to survive self and mortal consciousness without sacrificing our intelligence. But what kind of device could have accomplished this? What adaptation could possibly emerge in us that would relieve us of our incapacitating awareness of death without compromising our intellectual faculties?

Perhaps, at first, only those individuals whose cerebral constitutions somehow withstood the crippling anxiety that came with self-conscious awareness managed to endure. Nevertheless, something more was needed if the species, as a whole, was going to survive. Perhaps man's newly emergent awareness of death created so much tension in our animal that it induced a selective pressure on our cerebral physiologies. Just as environmental pressures transform entire species, why shouldn't these same pressures be able to transform our brain? Couldn't those same Darwinian principles be applied to our cerebral evolutions as well? How else are we to imagine that all of our other cognitive centers—be it linguistic, musical or mathematical-

emerged?

As a result of our species' capacity for self-conscious awareness, we suddenly needed to be modified in such a way that we could meet the new demands placed upon us by our new internal environments. What this meant, was that those individuals whose brains possessed some genetic mutation that could withstand the overwhelming anxiety induced by our awareness of death, were more likely to survive. Those more likely to survive, consequently, were more likely to pass whatever advantageous adaptation they possessed onto their offspring.

As generations of these protohumans passed, those whose cerebral constitutions most effectively dealt with the anxiety resulting from their awareness of death, were selected to survive. This process continued until a cognitive function emerged that altered the way these protohumans perceived reality by adding a "spiritual" component to their perspectives. Just as the human brain had evolved musical, linguistic and mathematical intelligence, we apparently evolved a "spiritual" intelligence as well.

In summary, our species'awareness of death placed such a strong pressure on our cerebral (cognitive) evolutions, that over the course of tens of millions of years—during the emergence of the hominids— Nature selected those individuals who developed a spiritual function. That function being a built-in perception that there exists an alternate and transcendental reality that supersedes the limitations of this finite physical realm which can only offer us pain, suffering and ultimately death.

THE COGNITIVE ORIGINS OF IMMORTAL CONSCIOUSNESS

Of those factors that may have influenced the evolution of a spiritual cognitive function, one to have played a key role incorporates man's unique capacity to enumerate. Because we live through time and space, we as animals possess an inherent awareness of these dimensions. For instance, most animals possess an internal biological clock (circadian rhythm), that serves to regulate an organism's behavior in relation to time. This internal clock will regulate such activities as the time of the day or year an animal will forage, sleep, or mate.

Many animals rely, to a large extent, on their sense of sight for survival. Because our planet's lighting conditions are determined by the earth's rotation around the sun, this rotational cycle plays a critical role in most

animal behavior. Furthermore, because our planet's revolution around the sun plays a critical role in the earth's climate, this, too, will have a dramatic effect on much organic behavior. Because our environmental conditions are framed by time, it's necessary that most organisms possess a biological clock as an aid in effectively surviving the earth's cycles of climate and light.

Besides possessing an inherent perception of temporal events, all life forms possess a built-in mechanism that enables them to perceive the world spatially. Even a plant, though it may be rooted to the ground, engages in heliotropic behavior, a propensity to turn its leaves to face the sun. Because we exist within a three-dimensional environment, most animals possess some combination of organs through which they can discern up and down, backward and forward, near and far. As mobile creatures, it would be impossible for an animal to survive without such sensibilities.

Though most animals possess a certain degree of temporal and spatial awareness, our species' capacity to comprehend both of these dimensions is by far the most advanced. Only humans can discern increments of time and space with such precision. By being able to apportion our world into such discrete spatial and temporal units, we have evolved the capacity to enumerate objects, that is, to count. (It was recently discovered that Rhesus monkeys possess the capacity to count groups of objects in consecutive order from one to nine, an example of our closely phylogenetically-related ancestors possessing an incipient talent for a predominantly human capacity.)

Because we possess this particular "mathematical" cognitive capacity, humans are able to measure moments in time as well as units in space. Because our species possesses an enumerating or mathematical function, we alone have been able to navigate our way across the oceans, continents, and, most recently, into extraterrestrial space. This capacity has also enabled us to construct immense architectural fortifications, countless machines and technologies, along with formidable instruments of healing as well as destruction, all things which have, for better or worse, served to make us the most powerful creature on earth. Although such capacities generally work to our advantage, just as our intelligence had backfired on us, this advanced capacity to enumerate affected us in a similarly hazardous way. I say this because inherent in our capacity to enumerate exists an awareness that this process has no finite end: No matter how big a number might be, we can always add one to it. Consequently, intrinsic to our capacity to add one plus

one lies the capacity to conceptualize infinity.

As only our species possesses this sophisticated a capacity to enumerate, only we have the capacity to comprehend the concept of infinity. (As mathematical consciousness represents a cross-cultural characteristic of our species, this would suggest that mathematical ability must constitute a genetically inherited trait. This would further imply that there must exist "mathematical" sites within the brain. The existence of mathematical "idiot" savants, people who can calculate into the billions but who also exhibibit general cognative impairments, would seem to confirm the existence of such a neurophysiological mechanism. As every culture has, either through words or symbolic images, conceptualized infinity, this would imply that there might exist a very specific part of our mathematical function that enables us to conceive of this very abstract notion. If such a neurophysiologically-based "infinity" site within our brain does indeed exist, it follows that we must also possess what we could call "infinity" genes that are responsible for the emergence of those sites.)

In the same way that we can enumerate units in space, we can do the same with moments in time. And just as we can comprehend the idea that one plus one equals two, we can equally conceptualize the notion that this present day plus one more equals tomorrow. It is from this same cognitive faculty that humans may have gained their capacity for foresight, one that has enabled every human culture to devise some a calendar by which it measures time in days, seasons and years.

Just as our enumerating capacity has enabled us to recognize that spatial dimensions possess no finite end, we can apply this same notion to temporal dimensions as well. Analagous to the way we can conceptualize infinity, we can equally conceptualize eternity. Just as we can keep adding one unit to any spatial dimension, ad infinitum, we can do the same with temporal dimensions, i.e., this moment plus the next moment equals the moment after, ad infinitum. With this capacity to conceive that temporal dimensions have no finite end, not only can we conceptualize our own futures all the way to our inevitable deaths but way beyond that into eternity. Because we can comprehend the concept of eternity, our species must live with an awareness that though we, our physical bodies, are temporal in nature, time itself will never end. With a conscious awareness of eternity, humans were suddenly forced to endure the notion of how infinitely brief life is. Whereas all other

creatures live in and for the moment, we now had to measure our existences against the overwhelming backdrop of all eternity. Suddenly, humankind had to contend with an inherent sense of its own ultimate and painful insignificance. In the words of the French philosopher, Blaise Pascal ,"the finite is annihilated by the infinite" (Pascal, 1660).

Consequently, due to our capacity to grasp the eternal and the infinite, our species now had to endure a new anxiety, one which may have rivaled that which came as a result of our debilitating awareness of death. Due to our capacity to comprehend the infinite and eternal, our newly emerged mathematical consciousness may have played just as significant a role in the evolution of a spiritual function as did our awareness of death.

Mathematical or numerical consciousness is apparently integrally interrelated with our sense of spiritual consciousness. This relationship is made evident by the fact that every world culture has attributed spiritual significance to various geometric designs as well as numbers. Whether it be the jewish Kabbalists, the Pythagorean Greeks, the medieval alchemists, the Christian use of the Holy Trinity, the use of numbers in Aztec mythology, numerical references made in the I, Ching, or the general use of numbers employed by the variety of astrological and numerological belief systems, every world culture has maintained a belief that numbers can possess spiritual or sacred content. Not only did we now need to be protected from actual death itself but from all of the possibilities that might exist long after death.

Suddenly, man was aware that he might exist (or for that matter, not exist) for all eternity. But how? In what form? Would eternity be a pleasurable or a painful experience? Would we retain our conscious identities and, if so, in what state? Would eternal existence be as replete with experience as this life or would it represent a state of bsolutenothingness, of eternal non-existence? What might that mean?

As it is natural for our animal to be concerned with its future, humans were suddenly condemned to spend their existences in search of what might happen to us not just during our lifetimes but long after death. With this new awareness, humans would now have to spend the duration of their lives, no longer just in fear of death, but in fear of what might come after death, in fear of eternal non-existence.

Rather than allowing these fears to overwhelm and destroy us, perhaps nature selected those whose cognitive variations compelled individuals to

process their concept of death in an entirely new manner. Perhaps after many generations of selection, a group of humans emerged who perceived infinity and eternity as an inextricable part of self-consciousness and self-identity. Perhaps a series of neurological connections emerged in our species that compelled us to perceive ourselves as "spiritually" eternal. Once we perceived ourselves as possessing an element of the infinite and eternal within us, as apparent as it was that our physical bodies would one day perish, we were constituted to believe that our conscious experience, what we refer to as our spirits or souls, would persist forever thus rendering us immortal.

Herein lies the cognitive origins of our cross-cultural belief in immortality, in our inherent perception that we-by virtue of our eternal souls-transcend physical death. Once we came to perceive consciousness as eternal in nature, we perceived physical death as nothing more than just another life-passage in eternal existence. Suddenly our animal was compelled to bury its dead with a rite that anticipated sending the deceased's eternal self or soul onward to another realm, or what had developed to become an inherent belief in an afterlife. With the help of this newly emergent predisposition to believe in our own immortalities, our species was relieved of a large part of the burden that came with our fear of imminent and eternal death. Humankind was saved.

THE COGNITIVE ORIGINS OF GOD CONSCIOUSNESS

But even if we were to live forever, what did that mean? Man still needed relief from the fear of the unknown. Would the afterlife be a place of eternal peace and happiness or would it perhaps be even more painful and precarious than this stay here on earth? Without our parents to protect us in the afterlife, we now needed eternal guidance and protection from all that might come in the inherently perceived hereafter. According to Freud (1927), "God is the exalted father, and the longing for the father is the root of all religion."

Aware that death was not only inevitable, but that it could come at any moment, human beings were reduced to a state of infantile helplessness, as vulnerable as the day they were born. And where do infants innately turn for protection? To their parents. However, not even one's parents can save one from death. As we become adults, we come to recognize that even our once seemingly-omnipotent parents are actually impotent against the forces of

death. With this knowledge, where was humankind to find eternal guidance and protection? Desperately longing for eternal comfort and security, to whom or what was primal man to turn? Perhaps our need for eternal protection had facilitated the selection of a cognitive genetic mutation that instilled our species with an inherent belief in some type of a transcendental guardian. Perhaps it was at this point in human cognitive evolution that neural connections had emerged that compelled the human animal to believe in a "higher"power, in what we refer to a god or gods.

As infants in the crib, when we experience pain or fear, we instinctively reach out to our parents for comfort and protection. It seems likely that our cross-cultural belief in a God represents an extension of that same instinct. As Freud expressed this same notion: The derivation of religious needs from the infant's helplessness and the longing for the father aroused by it seems to me incontrovertible, especially since the feeling is not simply prolonged from childhood days, but is permanently sustained by fear of the superior power of fate. I cannot think of any need in childhood as strong as the need for a father's protection (Freud, 1962).

As a result of the selective pressures placed on our species by our awareness of eternal death, neurological connections had emerged that generated an inherent belief in the supernatural as well as in an all-powerful, imaginary father figure whose infinite powers could protect us from death and all that came thereafter.

In summary, at some point in the last two million or so years, during the emergence of the latter hominid lines, a cognitive adaptation emerged that enabled us to cope with our awarenesses of death, while at the same time allowing us to maintain self-conscious awareness. By having this cognitive mechanism instilled in us, we were now "wired" to perceive physical death in a much more acceptable manner. Once nature had instilled us with neurophysiologically-generated cognitive phantoms who could protect us from inevitable death, humans were better equipped to survive their inherent fear of such.

"One of the major functions of religious belief is to reduce a person's fear of death." --Hood,

"Religion is a natural defense against man's knowledge that he must die"

--Ostow, 1953. Sheltered from the perpetual threat of inevitable death, humans could now proceed with the daily routine of maintaining their more earthly needs. With the emergence of spiritual consciousness, our cognitive functioning had been stabilized to the extent that we could now go on living in a state of relative calm, even amid our awareness of our inevitable demise. This, I contend, is the purpose of the spiritual function. This is its rationale, its reason for being. If all this is true, however, it suggests that God isn't a transcendental force or entity that actually exists "out there," beyond and independent of us, but rather represents the manifestation of an inherited human perception, a coping mechanism that comes in the form of a cognitive phantom generated from within the human brain.

26. Evolutionary Neurotheology & The Varieties Of Spiritual Experience

by Bruce MacLennan
University of Tennessee, Knoxville, Tennessee.

Abstract

The goal of this chapter is to outline an evolutionary neuropsychological foundation for spiritual and religious experiences. Central to this account are concepts from archetypal psychology, which, on the one hand, explain the structure of common religious experiences, but, on the other, are grounded in ethology and evolutionary biology. From this it follows that certain religious phenomena are objective, in that they are empirical, stable, and public. As a consequence, certain theological claims can be objectively confirmed or refuted. However, it would be a mistake to assume that this approach reduces religious experiences to the "merely psychological" or considers them inessential epiphenomena in a materialist universe. On the contrary, I will

show that it demonstrates the compatibility and even inevitability of transcendental religious experience—and its crucial importance—to biological beings such as ourselves.

Overview

How can we achieve a unified understanding of the universe, which comprehends the physical, psychical, and spiritual dimensions of reality? In this chapter I will argue that the archetypes, as described in the psychological theories of Jung and his followers, provide the crucial link between the material and spiritual worlds: on the one hand, they are grounded in evolutionary neuropsychology; on the other, they are the objective constituents of the spiritual world. This might seem to reduce the spiritual realm to the "merely psychological," or even to neural epiphenomena, but I will argue that this is a misinterpretation of the theory, and that the gods (or God) are objectively real and crucially important for meaningful human life.

Evolution and the Archetypes Ethology and the Structure of Behavior

All animal species exhibit characteristic behavioral patterns, commonly called instincts. These behaviors are served by perceptual systems, which are also characteristic of the species. These perceptual-behavioral structures, which are common to all members of a species, change very slowly, on evolutionary timescales, as the species continues to adapt to its (possibly changing) natural environment. The functions of these perceptual-behavioral structures must be understood in the context of the species' environment of evolutionary adaptedness, that is, the environment in which it has historically evolved and therefore to which it is adapted. One of the contributions of modern ethology, as developed especially by Konrad Lorenz and Niko Tinbergen in the mid-twentieth century, was to recognize that the meaning and function of behavior cannot be understood outside of this environment.

A species' genome defines a characteristic life-cycle pattern for each member of the species as it progresses from birth to death. However, the phylogenetic pattern of the species is expressed ontogenetically by an individual's development in and interaction with its particular environment, which may differ more or less from the environment of evolutionary adaptedness. (This is especially the case for modern humans, as will be discussed later.) Species-characteristic perceptual-behavioral patterns are

encoded in the structure of the brain, which is a result of the developmental program encoded in the genome. Various behavioral patterns (e.g., mating behaviors) may be potentiated at appropriate stages in an animal's development (e.g., sexual maturity), but they are activated through an innate releasing mechanism (IRM) by means of a releaser or sign stimulus (e.g., an estrus-related pheromone).

The human species is also characterized by genotypic perceptual-behavioral structures. Which specific structures are phylogenetic characteristics of our species ("nature"), and how they are ontogenetically modified by an individual's development in his or her particular environment ("nurture"), should be left to empirical research, and not prejudged by psycho-socio-political ideology. For my argument, it is sufficient to acknowledge that Homo sapiens, like other animal species, has characteristic perceptual-behavioral structures.

Archetypal Psychology and the Structure of the Psyche

Ethology studies species-characteristic perceptual-behavioral structures "from the outside," that is, by observing animals' behavior in their natural environment. However, when we are the animal in question, we may ask how these perceptual-behavioral structures are experienced "from the inside." The corresponding psychological structures are what Jung called archetypes: "To the extent that the archetypes intervene in the shaping of conscious contents by regulating, modifying, and motivating them, they act like the instincts" (Jung, CW 8, ¶404).

The archetypes are often confused with innate images, but Jung was explicit, especially in his later work (e.g., CW 9, pt. 1, ¶155), that they are not images, but dynamical structures of perception and behavior. They do not become images until they structure conscious content after being activated by a sign stimulus or other cause. The archetype "is not meant to denote an inherited idea, but rather an inherited mode of functioning, … a 'pattern of behavior'" (Jung, CW 18, ¶1228).

The archetypes reside in the collective unconscious, for the archetypes are unconscious until they are activated, and they are collective in that they are common to all humans. Although this idea is surrounded by much mysticism, "The hypothesis of the collective unconscious is, therefore, no more daring than to assume that there are instincts" (Jung, CW 9, pt. 1, ¶91). In addition

to the collective unconscious, we each have a personal unconscious, which is a result of our individual ontogenies in our particular environments (more later on this process).

Like the instincts to which they correspond, archetypes are potentiated at particular developmental stages in accord with a phylogenetically determined life-cycle (the human life-cycle). When an appropriate releaser (sign stimulus) occurs in the environment, the archetype is actualized, and begins its work of structuring conscious perception and of influencing motivation and behavioral disposition. Because the releaser is keyed into the archetype, the triggering situation or relationship is perceived as numinous and significant; the psyche is reoriented toward (evolutionarily) appropriate action. As examples, consider encountering a sexually exciting person or being confronted by a threatening, angry person.

Complexes, which are webs of associations, are created by intense or repeated activation of an archetype in the ontogenetic psyche; therefore they have personal material surrounding an archetypal core. Complexes normally reside in the personal unconscious, but when activated, they can intrude on consciousness by influencing perception, motivation, and behavior. We tend to think of complexes as pathological, but it important to understand that they are normal components of our psyches; indeed some are essential for our normal functioning, as will be explained in the next subsection. They are "the functional units of which the ontogenetic psyche [is] composed" (Stevens, 1982, p. 65).

The thwarting of "archetypal intent" can nucleate pathological complexes. Thus Stevens' Fourth Law of Psychodynamics says, "Psychopathology results from the frustration of archetypal goals" (Stevens, 1993, p. 86). However, this does not imply that archetypes should govern our behavior; rather, our moral problem is "what attitude we adopt to these fundamental a priori aspects of our nature—how we live them, and how we mediate them to the group. It is the ethical orientation that counts" (Stevens 1982, p. 240).

Some Specific Archetypes

It will be worthwhile to review some of the archetypal structures identified by Jung and his colleagues. Readers familiar with archetypal psychology might want to skim the remainder of this section. One of the fundamental archetypal relations for all primates is that between mother and

child. As the newborn infant begins to discriminate itself from its environment, the archetypal child-parent axis forms (the foundation of the ego-Self axis, discussed later). With greater awareness the child-parent axis differentiates into the child-mother axis and, from the child's perspective, the Mother archetype is actualized. Among many other things, the archetypal Mother symbolizes the source of care; she expresses home and family (the Eros principle and the centripetal orientation of the ego).

Later, as the father assumes a more important role, the Father archetype is actualized as one pole of the archetypal relationship between father and child. He is especially the source of order and mediates the outward relation to society and the rest of the world (the Logos principle and the centrifugal orientation of the ego).

As the child's sexual identity develops (as early as eighteen months), the contrasexual (opposite sex) characteristics remain undeveloped in the unconscious (analogous to contrasexual physical attributes after puberty: e.g., a man's breasts, a woman's clitoris). The contrasexual part in the female psyche is called the Animus (Latin for spirit, thought, will), and in the male is called the Anima (Lat., soul, vital principle). The contrasexual part exists both as an archetype, conditioned by biological development, and as a complex, conditioned by the environment. That is, the Anima/Animus is partly phylogenetic and partly ontogenetic; it is a sequential elaboration of the Mother or Father archetype.

There are many other archetypes, most of which are familiar from mythology (e.g., Maiden, Wise Old Man, Trickster), but they do not need to be discussed at this time. Although mythologists and archetypal psychologists are inclined to classify and name them, it is important to remember that they are connected into a continuum or continuous "field" in which there are real distinctions, but also borderline cases (von Franz, 1974, ch. 8).

The archetypal field as a whole is called the Self, which is therefore the sum total of human archetypes. As such it is the psychical aspect of the perceptual-behavioral structure encoded in the human genome, and hence it constitutes the "phylogenetic destiny" of the psyche. "The self is our life's goal, for it is the greatest expression of that fateful combination we call individuality" (Jung, CW 7, ¶404). The Self is unconscious as well as conscious, and therefore must be carefully distinguished from ego-

consciousness.

The Ego is the individual conscious mind, a complex that perhaps evolved to facilitate our adaptation to the environment, and is responsible for actualizing the life-cycle plan of the Self. Although ego-consciousness is crucial to our human nature, we tend to overvalue it, and forget that it is an "organ" evolved to facilitate the human species' survival in its environment of evolutionary adaptedness.

Many spiritual practices (as well as psychotherapeutic practices) are directed toward achieving a proper balance between the Ego and the Self.

The Persona (Latin: mask, role, character) is a complex, built on the Ego, that mediates the individual's adaptation to society. It is the face we present to the world (e.g., through the habitual attitudes and manners of behavior of our class and vocation). "One could say, with a little exaggeration, that the persona is that which in reality one is not, but which oneself as well as others think one is" (Jung, CW 9, pt. 1, ¶221). Our personas are essential to our functioning as social animals, so long as we avoid the danger of confusing our personas with our Selves.

The Shadow comprises all the traits and qualities consciously rejected by the individual and their culture (collective consciousness). It is therefore a complicated, multilayered complex comprising material rejected by the individual, by his or her family, and by larger significant groups, up to the culture at large. Like all complexes, it also has an archetypal core, based on an innate predisposition to dichotomize, but perhaps also including a phylogenetic predisposition against certain behaviors (e.g., incest).

However, since the Shadow compensates our conscious attitudes (which may be imbalanced), it is not entirely negative. Since ethology has established that some of our human perceptual-behavioral structures are shared with non-human species (e.g., mother-child bonding and social behavior in other primates), it is plausible to suppose that these animals also experience corresponding archetypes, not identical but homologous. Therefore, behind the archetypes that are our common human heritage, we can find others that are common to all primates; beyond these are the archetypes of mammals and of all vertebrates.

Can we go even further? Certainly some aspects of the structure of our psyches are consequences of the fact we are living beings, and further, that we are physical systems. As Jung said, "the 'psychic infra-red', the biological

instinctual psyche, gradually passes over into the physiology of the organism and thus merges with its chemical and physical conditions…" (CW 8, ¶420). For example, physical systems of all sorts exhibit characteristic forms of dynamical behavior (equilibrium, cycles, and chaos), which are also characteristic of the psyche and are therefore archetypal.

If we follow this line of reasoning, we are led to conclude that the most fundamental and universal archetypes are the laws of nature (whatever they may be discovered to be) experienced psychically (i.e., "from the inside," as opposed to through external observation). Therefore, among the most fundamental archetypes are the numbers, considered as qualitative ideas (e.g., unity, dichotomy, conjunction), for number "preconsciously orders both psychic thought processes and the manifestations of material reality" (von Franz, 1974, p. 53). These considerations may seem to stretch the idea of the unconscious too far, but they are necessary if we are to achieve an understanding that embraces the physical, psychical, and spiritual.

Archetypal Theology - The Archetypes and the Gods

Having reviewed some of the principal archetypes and their evolutionary neuropsychological foundation, I will turn to their theological implications. It is best to begin from a polytheistic perspective, for "archetypal psychology is necessarily nonagnostic and polytheistic" (Hillman, 1975, p. 226; see also Hillman, 1983, ch. 10; Miller, 1981). Nevertheless, my conclusions apply equally well to monotheism, as is explained later.

The archetypes are much bigger than individual people, and therefore no person can completely fulfill an archetype. It is normal to project an archetype onto a person (such as projecting the Mother archetype onto your personal mother), but with maturity we retract the projections, and differentiate the real person from the idealized archetype. Nevertheless, the unfulfilled potential of the archetype remains, and we are left with a longing for the idealized figures they represent. Further, the archetypes call for complete actualization (for that is their biological function), and urge us to seek them. Likewise, the sum total of the archetypes, the Self, seeks actualization of the genomic potential of the species in the life of the individual, which gives rise to the drive for fulfillment that Jung called individuation.

Once the projections are withdrawn, we realize that the archetypes exist

independently of the concrete individuals that may manifest them; or, in other words, we may say that the archetypal structures exist in the genotype independently of the individuals that trigger their innate releasing mechanisms. That is, the archetypes are autonomous; they exist independently of human psyches in the same sense that the human genotype exists independently of individual humans.

For example, when the projection of the Mother archetype is withdrawn from the concrete mother, the archetypal Great Mother remains to represent the Eros principle. Similarly the personal father comes to be differentiated from the Heavenly Father as representative of the Logos principle. These are, of course, only two examples (though important ones) of many.

It is well known that the archetypes correspond to the gods of various pantheons, and that mythology often encodes archetypal relationships; there is no need to attempt to summarize here the extensive specific work of many archetypal psychologists (Jung, 1998, may be cited as an introduction). Rather, I will take the identity of god and archetype for granted, and focus on the question of whether the gods are real or "merely psychological." According to common scientific standards, we may say that the archetypes (the gods) are objectively real phenomena if they are empirical, stable, and public.

The archetypes are empirical phenomena in the primary sense of those words because they manifest as appearances (Greek, phainomena) that arise in experience (Grk., empeiria). The archetypes themselves are not directly experienceable, because they reside as potential perceptual-behavioral structures in the unconscious. However, we experience their effects when they actualize in consciousness, and from these empirical effects we can infer the archetypal structures causing them, which does not make them any less real. "The existence of the instincts can no more be proved than the existence of the archetypes, so long as they do not manifest themselves concretely" (Jung, CW 9, pt. 1, ¶155). Science commonly infers, from their effects, causes that are not directly observable (e.g., elementary particles, force fields).

That these experiences need not have external referents, that is, corresponding physical phenomena external to the observer, does not negate their empirical validity. Psychology must take them as givens (Lat., data), for its subject matter is the psyche and whatever appears to it (phainomena). All

sciences, from physics to sociology, are grounded in the experiences ("observations") of an individual psyche.

The archetypes are stable phenomena, another criterion of objective reality. From the earliest recorded mythologies, to the cosmologies of surviving traditional cultures, to the dreams and fantasies of contemporary people, we find the same archetypes recurring across time and place. Indeed, it was this observation that first led Jung to hypothesize the existence of archetypes (Jung, CW 10, ¶847).

The forgoing also shows that the archetypes are public phenomena; that is, when suitably trained observers investigate the unconscious, they reach consistent conclusions about its archetypal structure. (The prerequisite of suitable training is common to all but the simplest sciences; one must learn how to read even a thermometer correctly.)

Therefore the archetypes are empirical, stable, and public, which are the accepted scientific standards for the objective reality of a class of phenomena. Hence the archetypes — the gods — are real.

Nevertheless, it's worthwhile to say a little more about the manner of existence of the archetypes, about their ontological status. Fortunately, we have some analogous situations to guide us, for if, as has been argued, the archetypes are the psychical aspect of phylogenetically-defined perceptual-behavioral structures, then the archetypes are functions of the human genome, which is a mathematical pattern.

Therefore the archetypes exist in the same way as other mathematical patterns, as (Platonic) forms independent of their physical embodiment (or lack thereof). They are formal, not material. This conclusion is strengthened by our broadened perspective on the archetypes, which reaches beyond the human species, to non-human species and their underlying physical processes. For these processes are governed by mathematical laws, and therefore their archetypal correspondents in the psyche must be likewise mathematical in structure. Again, the existence of the archetypes (the gods) is akin to the existence of mathematical patterns (forms). The laws of nature (whatever they may be) are what they are, and would be so, even if there were no material universe to obey them. Therefore the archetypes exist independently of physical embodiment (they are immaterial).

That the physical, psychical, and spiritual worlds converge in the realm of mathematical form is not a new idea; it is attributed to Pythagoras, and was

developed over two and one-half millennia of Platonic, Neoplatonic, and Neopythagorean thought. Indeed, it lurks in the intellectual background of archetypal psychology (Hillman, 1983, pp. 4-5). However, the modern perspective dictates some changes in this venerable theory, which we must consider.

Traditionally, the archetypes have been considered eternal and unchanging, and so they are, from an individual's perspective. However, the archetypes do change slowly with the human genome, that is to say, at evolutionary timescales. Therefore they have changed little if at all in the last hundred thousand years or more. The deeper archetypal structures are even older (at least four million years for hominids, 55 million years for primates, 500 million for vertebrates); the laws of physics are unchanging and therefore eternal. Thus we can conclude that the archetypes — the gods — change very slowly.

Certainly they have not changed in recorded history. Rather, our gods are the same as those of our hunter-gatherer ancestors who lived a hundred thousand years ago.

The reader may grant that the archetypes are objectively real and effectively eternal, but may be reluctant to call them "gods." To argue that they deserve this appellation requires a discussion of their role in our lives.

The archetypes are a source of meaning because they integrate individual lives into the greater patterns of humanity and the universe; they give transpersonal meaning and significance to situations and relationships in human life. From an ethological perspective humans are primed, through innate releasing mechanisms, to respond in characteristic ways to the corresponding releasers (sign stimuli).

When such a pattern of perception and behavior is released, the individual fulfills part of his or her destiny as a member of the human species. From a psychological perspective, the sign stimulus appears charged with significance and meaning; the archetype is activated and appears in consciousness as an archetypal image. When an archetype is actualized, the resulting situation or relationship is experienced as numinous, supernatural, uncanny, hallowed, blessed, or miraculous.

Being in love is a familiar example of an archetypal situation; everyone has experienced its power to transform perception and behavior. The beloved is surrounded by a numinous aura, and the relationship is charged with

meaning. Therefore, it is not surprising that the ancients saw the hand of a god (Aphrodite or Eros) in such relationships. Indeed, "Aphrodite" and "Venus" were sometimes used as common nouns meaning sexual love, desire, and charm, and Eros (love, desire) was worshipped as a god from an early period (Hornblower & Spawforth, 1996, s.v. Eros). Plato (Phaedrus 245b-c) famously classified love (erôs) as a kind of divine madness (theia mania). Significantly, he claimed that love stems from the "recollection" of the eternal forms, acquired before birth; in our terms, love is an actualization of certain innate archetypal patterns.

When we are in an archetypal situation, we are under the influence or compulsion of a god. That is, we are drawn into the narrative of a phylogenetic "script" (which does not imply, of course, that we have no control over the situation); we may feel like we are living a myth (as, indeed, we are).

There are two poles to the archetypal relation: the experiencing ego and the "other" towards which the perceptual-behavioral "script" is directed. The entire relationship is divinely (archetypally) guided, and each pole may be experienced as inspired by a god. The ego may experience itself as "possessed" by a divinity (Eros, in the proceeding example), whose intentions may conflict with the ego's. Similarly, the "other" (often a person) may be perceived as divine, numinous, magical, or radiant.

For example, the beloved is experienced as a god or goddess. Of course, the beloved is not a god or goddess. People are not archetypes, and the practical difficulties of treating them as such are well known. In psychological terms, we should withdraw the projection; although the archetypal relation is authentic, we cannot forget that an archetype cannot be manifested completely by an individual; the archetype may touch a human, but it is superhuman and resides elsewhere.

It is even more dangerous to confuse oneself with a deity, the ancient sin of hubris, the psychological condition of ego inflation. "Possession" by a divinity is not necessarily a bad thing (who would reject the divine madness of love?) — another word for it is inspiration (Grk., entheos, "having the god within") — but it is crucial to be consciously aware of what is taking place (an archetypal actualization), nor should one abandon the "ethical orientation" of the ego.

Morality and the Gods

Are the gods good? Ancient theologians debated the topic. The traditional mythology did not present them as moral ideals, and popular belief tended to agree, but intellectuals were more inclined to think that the gods must be good. If we take the ethological perspective on the problem, we can say that archetypal structures have evolved by conferring selective advantage to humans in our environment of evolutionary adaptedness; in this broad sense, they can be called "good." But does that make them moral ideals? Certainly, the archetypes are real forces, which cannot be ignored or thwarted with impunity; psychopathologies result from "frustrating archetypal goals." But few would advocate that we blindly follow our biological urges.

Furthermore, the gods may have differing demands, and may even war with one another. At least that was the view of traditional mythology and epic, which, again, the intellectuals found unacceptable.

However, ethology teaches us that the traditional view was more accurate. An animal may find itself in the grips of two incompatible patterns of behavior (fight or flight is an obvious example); ethologists say that it is in a state of conflict. Psychologically we may find ourselves in the grip of incompatible archetypes (gods), each urging toward the fulfillment of its own purpose. So three goddesses appeared to Paris, each pushing him to fulfill her own archetypal plan. From a theological perspective, we may be placed in real existential dilemmas. Gods cannot be disobeyed without dire consequences, yet in a case of archetypal conflict we are faced with reconciling warring deities. In facing such a dilemma, it is not simply a matter of choosing good over evil, for each of the gods is good in the sense that they serve the species (and, beyond that, life in general). They each have a legitimate claim on us.

More accurately, I think, the gods should be considered "beyond good and evil." Psychologically, all archetypes are positive and negative, because they are prior to conscious discrimination, and therefore prior to human morality. Hence, Aphrodite causes us to love our spouses and to start families, but also urges us to extramarital affairs. Ares encourages us to strike when we're angry, but also to defend our homeland. The clever words granted us by Hermes can win support for a just cause, or they can cheat and deceive. The Sky Father Zeus enforces laws and rules, but sometimes to the point of cruelty. The Great Mother nurtures her children, but may smother or even

devour them. And so on, for all the other gods.

In my examples, I have drawn from Greek mythology, as is often done in archetypal psychology, because of its seminal role in Western culture. Nevertheless, one may wonder how well these myths reflect human archetypal structures. Although it is ultimately an empirical question (which Jung and others have addressed through their investigations), we may with some confidence say that the true gods are the gods of Paleolithic hunter-gatherers.

Based on the work of Fox (1989), Stevens (1993, p. 67) observes that we have spent 99.5% of our species' history as hunter-gatherers, and therefore it is the environment and life of the hunter-gatherer that has contributed most to our genetic heritage. What was it like? Our communities were "organic extended kinship groups" comprising "forty to fifty individuals, made up of approximately six to ten adult males, about twice that number of childbearing females, and about twenty juveniles and infants" (Stevens, 1993, p. 67). They were homogeneous in beliefs and practices and structured around families (not necessarily monogamous). Such communities frequently encountered each other, for marrying, warring, and other purposes.

This is our environment of evolutionary adaptedness. Therefore, the gods who ruled these people are the gods who rule us yet, like it or not. Of course we no longer live as hunter-gatherers, and few would advocate that we return to that life. Nevertheless, the archetypes are real forces, and while they should not be obeyed blindly, neither can they be ignored without consequences. It is the function of ego-consciousness to find ways to live in the modern world without denying the gods of our hunter-gatherer ancestors.

However, we should beware of supposing that the ego can dominate or repress the archetypes; the ego is an organ of the Self, not vice versa. To act as though the ego is all-powerful is, in fact, to be "possessed" by the Hero archetype (an authentic archetype, to be sure, but just one of many). "That way madness lies": ego inflation, which calls forth Nemesis (the "justifiable anger of the gods") to punish the hubris of the hero who imagines that he is the master over the gods (Hillman, 1975, pp. 178-80).

Since I have presented the archetypes in the context of polytheism, the reader may be impatient about how it applies to monotheistic religions. Briefly, in archetypal psychology, the Self occupies a position comparable to the God of monotheistic religions. The individual archetypes are then aspects

of God, or subsidiary spirits (e.g., angels and demons). This, in fact, was one way the classical gods were interpreted by early Christian theologians (e.g., Seznec, 1981).

The Special Role of the Anima/Animus

Among the archetypes the Anima/Animus has a special position, for it is the nearest component of the unconscious; therefore it is the proximate representative of the divine other. Thus, this archetype can function as a psychopomp (soul guide) leading us to greater knowledge and communion with spiritual world.

The Anima of a man often acts as divine Muse, a source of creativity and access to feelings, because she is open to the nonrational and so provides an opening to the unconscious and soul. Thus the ancient poets invoke their Muses, which is more than just a convention. Another well-known mythological example of the Anima is Athena, whom we see caring for Odysseus in the Odyssey.

Similarly, the Animus of a woman often acts as a source of rational purposefulness and intellect, and, as representative of the Logos principle, points the way toward the spirit. Many women have found the Animus to be a source of strength as they move into traditionally male vocations. Alternatively, the Animus may call a nun, for example, to become a "bride of Christ."

However, if the Anima or Animus is not consciously integrated, it may possess the ego or be projected on others in primitive ways. If it is projected, then a person may misperceive members of the opposite sex. For example, a man may perceive women as irrational children or seductive nymphs; a woman may perceive men as cold, aggressive, or remote. If possession occurs, then a person may act out the least differentiated characteristics of their contrasexual part. Thus, the animus-possessed woman may become inappropriately bossy, aggressive, judgmental, opinionated, or intolerant, while the animapossessed man may become touchy, resentful, overly emotional, sentimental, or irrational (Jung, CW 9, pt. 2, 24-35).

Obviously, integration of the contrasexual part of the psyche does not mean losing one's sexual identity. Rather, by establishing a conscious relation with this archetype, one achieves greater psychic balance, and recruits its powers, especially in establishing a connection to the other

archetypes (gods). This is especially the task of the second half of life, when the Self urges the psyche to reclaim its rejected and neglected parts. From a theological perspective, the gods and spirits call one to make alliances with them and to put the ego in service to the higher Self.

As remarked in an earlier Section, the Anima/Animus exists as both archetype (god) and as complex. The archetype is a high god (e.g., Athena for men, Dionysus for women), whereas the complex is a more personal spirit, more involved with one's individual life. The complex thus acts in behalf of the archetype, serving as usual as mediator between the personal and the archetypal. (For more on the Anima/Animus, see E. Jung, 1957, and Jung, CW 9, pt. 2, ch. 3.)

Complexes and Mediating Spirits

As discussed in an earlier Section, the personal unconscious comprises complexes formed through the interaction of archetypes and our individual lives; in theological terms, we can say that each complex is the offspring of a god, assigned to an individual. The archetypes are the same for everyone, and in this sense they do not treat us as individuals. The complexes, however, are a hybrid of the general and the particular, the universal and the personal. We may even say that they "know" us, for the particulars of our individual histories are stored in the web of associations of which they are constituted. Therefore complexes function as mediating spirits, intermediate between a person and a god. It may seem an exaggeration to identify psychological complexes with mediating spirits, but "complexes behave like independent beings" (Jung, CW 8, ¶253); they are autonomous personalities.

The ancient Greek word for such a mediating spirit was daimôn, which could refer to any divine spirit, but was especially applied to the mediators between humans and gods; it did not have the negative connotation of our word "demon" (Burkert, 1985, III.3.5). Many ancient cultures believed that each man had a genius (and each woman a iuno) that was born with them and stayed with them throughout their lives; this personal spirit has been explicitly identified with the unconscious mind (Onians, 1951, pp. 127-67). Some philosophers thought that each person had both an attending "good spirit" (agathos daimôn) and an interfering "bad spirit" (kakos daimôn), sometimes euphemistically called "the other daimôn." This reflects the moral ambivalence of our complexes, which from the perspective of ego-

consciousness may be good or bad. Like the archetypes (gods), the complexes (mediating spirits) have their own agendas, which may or may not agree with our egos'.

Also like the archetypes, we may be "possessed" by a complex, or project it onto others (that is, from our perspective, one of our complexes may "possess" another person). Projection of complexes is not strictly a matter of perception on the part of the projector, for the receiver may accept the projection and therefore also experience the possession. The two may therefore enter into a reality-altering state of mutual projection. For example, a person may accept the role of scapegoat projected onto them by a group.

Mutual projection also arises in families, since children are prone to accept projection from their parents. Unlived or rejected aspects of the parents may be projected onto the children, who become possessed and either reinforce or compensate their parents' imbalances; such possessions can continue even after a parent's death. Such is one cause of "family curses" (e.g., the House of Atreus), in which pathological complexes are passed on from generation to generation.

Projection and possession (which are not necessarily bad) may be difficult to identify, because our complexes are closely bound to our personalities, and therefore hard to differentiate from ourselves. Indeed, it can become difficult to distinguish one's authentic personality from the crowd of personal complexes.

One sign of "possession" is a defensive feeling when the complex is threatened. Therefore, a person may overreact emotionally when an intellectual position (such as a philosophical or political opinion) is criticized or even questioned. In general, complexes are created from strong emotional charges, and so sudden changes of mood or feeling (in the absence of obvious causes) may indicate that one has been possessed (or released from possession). Also, complexes often appear in dreams.

Since our "personal demons" affect our perception and behavior, it is important to be aware of them, even to befriend them. Because a god has created them, they cannot, in general, be "banished" (dissolved), nor should we wish to do so, for they are channels of divine (archetypal) energy into our personal lives. On the other hand, we cannot allow ourselves to be ruled by them, for we have a conscious ethical standpoint, but they do not; like the gods, they are beyond good and evil.

Therefore, the first requirement is to come to know your "demons," especially when they possess yourself or (via projection) someone else. Once known (and even named), they are less liable to possess or project. Next, one must enter into a dialogue with them, and reach some mutually agreeable alliance or, if that be impossible, reconciliation. Since they are spirits mediating between the gods and us, they can become invaluable allies in helping us to live in accord with divine providence, which is the goal of psychological individuation.

Again, possession and projection are not necessarily bad. To be the object of projection can be liberating and empowering; consider the effect of being the object of someone's infatuation, or of being perceived as a great genius. The result can be beneficial, provided we bask in the glow only for a while, and avoid possession. Furthermore, since a complex is a spirit mediating our relation to a god (archetype), it can be an enormous source of inspiration. It is no coincidence that the most creative people in all endeavors seem to be "possessed" by their callings (Jung, CW 17, ¶¶300-4). For more on complexes see, for example, von Franz (1980).

The Shadow: Collective and Personal

Gods in polytheistic religions are not generally all-good or all-bad, therefore we do not find figures comparable to Satan in these religions. Rather, each of the gods has good and bad aspects,although even this puts the issue too much in our terms; the gods, as agents of divine providence, have their own purposes, which we may view from a human perspective as good or ill (for us). We are all too apt to assume that humans are at the center of the universe, and therefore that the perspective of humanegos and our collective conscious values should be the universal norm. Nevertheless, we are humans, and there are spirits and perhaps even gods that are evil in human terms.

We may begin at the personal level: we have seen that the Shadow, which resides in the personalunconscious, comprises all the traits and characteristics consciously rejected by the ego; in this sense it is "evil" (by definition). The Shadow is a complex, and therefore everything I have said about complexes applies to it; in particular, it may possess and project. These are especially insidious in the caseof the Shadow: since it embodies everything that we reject, we are loath to admit it as our own; Prospero takes an enormous step

toward psychic integration when he says of Caliban, “this thing of darkness I / acknowledge mine” (Tempest V.i.324-5).

One simple way to discover the nature of your own Shadow is to ask yourself what sort of person you find most despicable or impossible to endure; that is your Shadow (Stevens, 1982, p. 215). There-fore, when we encounter a person who strikes us this way, we can be confident that we are projecting our Shadow onto them. (To be sure, such a person normally has something in common with our Shadow— that is the releaser that invites the projection — but it may be trivial compared to what we project onto them.) Worse, they may even accept our projection, and by becoming possessed by our Shadow, become our worst nightmare. However, if you are familiar with your Shadow complex, you may recognize its familiar features in the other person, and be able to withdraw the projection to both of your benefits.

Since the Shadow grows out of a person’s individual development, it incorporates consciously and unconsciously acquired values and beliefs about what is bad or wrong. Since much of this development takes place in the context of the family, much of the Shadow is likewise shared. Again, a collective Shadow complex common to a family (or larger group) may be experienced as a “family curse” (e.g., a tendency of abused children to become abusive parents, or a “curse” of substance dependency).

Further, the collective consciousness of a culture may generate a commonly shared Shadow, which then assumes the dimensions of “archetypal Evil.” This Shadow may possess or project, like any other complex, and is especially likely to be projected onto minority or other disenfranchised groups. (Since the Shadow is consciously rejected by the group, it is by definition not “us”; therefore it must be “them.”)

Failure to recognize the essential amorality of the gods leads to their (apparently) negative aspects being relegated to Shadow figures, which leads us into a distorted relationship with divinity. “The brighter the light, the darker the shadow it casts”; thus all-good Gods must have all-evil Devils to balance them. Similarly, failure to recognize our personal Shadows leads to their projection onto others.

As with all complexes, knowledge of the Shadow diminishes its power. Recognizing that the gods have their own purposes and attempting to understand them aids us in establishing a relationship with them that neither denies their reality nor requires us to abandon our ethical standpoint. The

mediating spirits help to establish this harmonious relation with divinity.

Aside from avoiding possession and projection, knowing your Shadow has other important benefits. Because it is the complement of collective and personal consciousness, it has many powerful characteristics and powers. If you are primarily a thinker, then your Shadow is dominated by feeling. Since your Shadow wants to bring a feeling orientation to life, by forming an alliance with the Shadow you can balance your conscious personality while satisfying its needs. In summary, integrating the traits of the Shadow into consciousness is a major stage in becoming psychologically whole.

Failure to assimilate our Shadows — individual and collective — is perhaps the biggest problem facing our world. (For more on the Shadow, see Jung, CW 9, pt. 2, ch. 2.)

The Self and the One

The archetypes, as psychical aspects of the instincts, all have their own purposes, but together —as the archetypal Self — they served the survival of our species in its environment of evolutionary adaptedness. So also, although the gods have their own agendas and purposes, together they are aspects of one archetypal system, which provides a universal foundation of significance and meaning for humankind. Therefore, many polytheistic religions have seen the gods as being under the direction of one chief god, or as constituting some kind of unified godhead, which is closely identified with the notion of divine providence. For convenience I will use Neoplatonic terminology and call this deity "the One."

Before discussing the notion of providence, however, we must look more closely at the godhead. As discussed in the previous Section, behind the human archetypes, we find more fundamental archetypes shared by all primates; thence we proceed until we come to the archetypes of all living things, and ultimately to the archetypes of all physical systems. From the physical side, whatever the evolved perceptual-behavioral structures of humans or other animals, they must obey the laws of nature (including the laws of evolution), whatever they may be. From the psychical side, whatever the archetypal gods of humans may be, they are subject to more remote gods who govern all life, as these in turn are subject to that One that is the psychical aspect of the laws of nature. From the physical perspective, the eternal laws of nature govern the process of the universe through all time;

from the psychical perspective, the eternal One — through timeless divine providence — governs the activities of all souls, including those of gods, mediating spirits, and mortals. (Such "governance," of course, need not imply determinism.)

This divine One cannot but remind us of the God of monotheistic religions, but we must beware of transferring notions from the latter to the former. The One comprises the entire universe; it is allinclusive and therefore paradoxical. Even more so than the individual gods, the One is beyond good and evil, for it includes all the gods and everything else. Certainly, many of the philosophers have told us that God is good, and that everything God does is good, but this "good" must be interpreted in the transvalued, super-human sense that it serves universal providence. We should not be so anthropocentric as to assume that this "good" will be to the benefit of the human species, let alone to the benefit of you or me.

Such a god and such providence may seem remote in the extreme. Nevertheless, the human archetypes — the gods of our hunter-gatherer ancestors — bring providence — and meaning and significance — into the human world and, both directly and through the agency of mediating spirits, into our individual lives. Therefore, by becoming conscious of these spirits and gods, and by striving to live, with their aid, in accord with providence, we can live meaningful lives through conscious, intentional participation in the destiny of the universe.

This is the lifelong process that Jung termed individuation (becoming individuus — undivided). That is, "Individuation is a conscious attempt to bring the universal programme of human existence to its fullest possible expression in the life of the individual" (Stevens, 1982, p. 142). (There are various practices, such as active imagination, for entering into dialogue with gods and mediating spirits; see Jung, 1997, or Johnson, 1986, for introductions.)

Within each of us is a Paleolithic hunter-gather; this is "the spiritual, inner and complete man" (Jung, CW 9, pt. 1, ¶ 529), the archetypal or primal human. But, although the archetypal human is a hunter-gather, we can neither blindly obey him (for we are not hunter-gatherers), nor can we blithely ignore him (for he is our essence). As in the other cases we have seen, our existential project is to reconcile modern life with the needs of this god. We become whole humans by consciously incarnating the god. (For more on the Self, see

Jung, CW 9, pt. 2, ch. 4.)

The Neural Basis of Archetypal Theology

Much work remains to be done on the neural processes underlying human instinctual behavior, and therefore the archetypes and complexes. Nevertheless a few hypotheses may be mentioned.

Following Stevens (1982, pp. 247-75), it seems that most activity in the midbrain and brain stem is unconscious. Therefore it is likely that the archetypes have their neurological roots in the brain stem, which is responsible for primary instincts, maintaining alertness, and similar basic functions. (Indeed, their roots go deeper yet, into physiological and physical processes, as already discussed.) However, archetypal structures also extend upward into the midbrain (especially the limbic system), which is concerned with appetites, emotions, and some of the less rigid aspects of the instincts. They extend even into the cortical hemispheres, where they enter conscious experience. Although activity in the cortex is conscious, it has a different character in the two hemispheres, and so the dominant, verbal, "logical" left hemisphere may have trouble expressing the imagistic activity of the right hemisphere, which therefore seems mysterious and numinous (Stevens, 1982, p. 266). The personal unconscious and its complexes seem to reside in the lower cortical regions.

Individuation presupposes better integration of neural activity in all parts of the brain. The dominant left hemisphere has learned to inhibit information crossing the corpus callosum from the right hemisphere, and both hemispheres may inhibit inputs from the midbrain and brain stem. Various spiritual practices, such as prayer, meditation, and ritual can allow access to these deeper, more archetypal brain systems.

Further, the ventromedial cortex (subgenual cortex) controls communication between the prefrontal cortex and the limbic system, so it is an important mediator between consciousness and the unconscious. It seems to govern the integration of perceptions and thoughts into a meaningful whole; changes in its activity are correlated with mania and depression (Drevets & al., 1997). Therefore increased activity in this area may be important in religious experiences, such as states of mystical union. Understanding the neuropsychology of such experiences does not diminish their reality, for they do in fact reflect real contact with the transcendent One.

27. Sex, Violence And Religious Experience

by R. Joseph
BrainMind.com

THE LIMBIC SYSTEM & VIOLENT BEHAVIOR

The neocortical surface of the brain (the so called "gray matter") is the seat of the rational mind, being concerned with language, math, reasoning, and higher level cognitive capacities. Beneath this neocortical mantle, buried within the depths of the cerebrum are several large aggregates of limbic structures and nuclei which are preeminent in the control and mediation of all aspects of emotion including violent, aggressive, sexual, and social behavior and the formation of loving attachments. The limbic system controls the capacity to experience love and sorrow, and governs and monitors internal homeostasis and basic needs such as hunger and thirst, including even the cravings for pleasure-inducing drugs (Bernardis & Bellinger 1987; Childress, et al., 1999; Gloor 1992, 1997; LeDoux 1992, 1996; MacLean, 1973, 1990; Rolls, 1984, 1992; Smith et al. 1990). Over the course of evolution, the forebrain and much of the neocortex (and the so called "rational mind") evolved in response to and so as to better serve the limbic system and fulfill and satisfy limbic needs.

However, the limbic system is not only predominant in regard to all aspects of motivational and emotional functioning, but is capable of completely overwhelming "the rational mind" due in part to the massive axonal projections of the amygdala upon the neocortex. Although over the course of evolution a new brain (neocortex) has developed, Homo sapiens sapiens ("the wise may who knows he is wise") remains a creature of emotion. Humans have not completely emerged from the phylogenetic swamps of their original psychic existence. Hence, due to these limbic roots, humans not uncommonly behave "irrationally" or in the "heat of passion," and thus act at the behest of their immediate desires; sometimes falling

“madly in love” and at other times, acting in a blind rage such that even those who are ‘loved” may be slaughtered and murdered.

The schism between the rational and the emotional is real, and is due to the raw energy of emotion having it’s source in the nuclei of the ancient limbic lobe — a series of structures which first make their phylogenetic appearance over a hundred million years before humans walked upon this Earth and which continue to control and direct human behavior.

Humans, although rational creatures, are also killers, men in particular. Men are natural born killers, which is why the history of human affairs is written in gore and blood. This sad state of affairs is due to the incredible power of the limbic system which, when aroused, can hijack and gain complete control over the rational mind. Unfortunately, as the limbic brain also mediates spirituality and religious experience, not uncommonly the worst of crimes and the worst of murders, are committed in the name of god and in the name of religion.

FUNCTIONAL OVERVIEW

In general, the primary structures of the limbic system include the hypothalamus, amygdala, hippocampus, septal nuclei, and anterior cingulate gyrus; structures which are directly interconnected by massive axonal pathways (Gloor, 1997; MacLean, 1990; Risvold & Swanson, 1996). With the exception of the cingulate which is referred to as “transitional” cortex (mesocortex) and consists of five layers, the hypothalamus, amygdala, hippocampus, septal nuclei are considered allocortex, consisting of at most, 3 layers.

The hypothalamus could be considered the most “primitive” aspect of the limbic system, though in fact the functioning of this sexually dimorphic structure is exceedingly complex. The hypothalamus regulates internal homeostasis including the experience of hunger and thirst, can trigger rudimentary sexual behaviors or generate feelings of extreme rage or pleasure. In conjunction with the pituitary the hypothalamus is a major manufacturer/secretor of hormones and other bodily humors, including those involved in the stress response and feelings of depression.

The amygdala has been implicated in the generation of the most rudimentary and the most profound of human emotions, including fear, sexual desire, rage, religious ecstasy, or at a more basic level, determining if

something might be good to eat. The amygdala is implicated in the seeking of loving attachments and the formation of long term emotional memories. It contains neurons which become activated in response to the human face, and which become activated in response to the direction of someone else's gaze. The amygdala also acts directly on the hypothalamus via the stria terminalis, medial forebrain bundle, and amygdalafugal pathways, and in this manner can control hypothalamic impulses. The amygdala is also directly connected to the hippocampus, with which it interacts in regard to memory.

The amygdala maintains a functionally interdependent relationship with the hypothalamus in regard to emotional, sexual, autonomic, consumatory and motivational concerns. It is able to modulate and even control rudimentary emotional forces governed by the hypothalamic nucleus. However, the amygdala also acts at the behest of hypothalamically induced drives. For example, if certain nutritional requirements need to be meet, the hypothalamus signals the amygdala which then surveys the external environment for something good to eat (Joseph, 1982, 1992a). On the other hand, if the amygdala via environmental surveillance were to discover a potentially threatening stimulus, it acts to excite and drive the hypothalamus as well as the basal ganglia so that the organism is mobilized to take appropriate action.

When the hypothalamus is activated by the amygdala, instead of responding in an on/off manner, cellular activity continues for an appreciably longer time period (Dreifuss et. al., 1968). The amygdala can tap into the reservoir of emotional energy mediated by the hypothalamus so that certain ends may be attained.

LIMBIC LUST, MURDER, AND RELIGIOUS EXPERIENCE

The amygdala and hypothalamus often act in a highly coordinated manner in reaction to an exceedingly important emotional stimulus, or in response to a specific limbic need, such as hunger, thirst, rage, or sexual desire (Joseph, 1992a, 1996; MacLean 1969, 1990). For example, in response to hypothalamically monitored needs (hunger, sexual desire), the amygdala may scan the environment until it determines that a particular food item or person, has the necessary attributes (Gloor 1992; Joseph 1992a,b, 1996; Kling et al., 1987; O'Keefe and Bouma 1969; Ursin and Kaada 1960). In response to urgent hypothalamic desires, the amygdala might even assign sexual

attributes to an individual that normally might not be viewed as sexually enticing.

It is also through hypothalamic and amygdala activity that a particular item or object (e.g. a banana) might be viewed as both a food item and sexual object. Or conversely, why certain individuals may be viewed as sexual as well as aversive and hateful (e.g. one's husband or wife). Indeed, because the hypothalamus and amygdala are so concerned with sex, rage, fear, and hunger, not only may these attributes be assigned to one individual, animal, or object simultaneously (e.g. fear of the beast one is going to enjoy killing and eating; hunger, guilt, and aversion regarding a high caloric treat; hatred for a loved one) but these conflicting emotions may be combined so as to give rise to exceedingly intense, albeit abstract emotional states; e.g. religious awe as well as religioius rage.

HYPOTHALAMIC RAGE

Stimulation of the lateral hypothalamus can induce extremes in emotionality, including intense attacks of rage accompanied by biting and attack upon any moving object (Flynn et al. 1971; Gunne & Lewander, 1966; Wasman & Flynn, 1962). If this nucleus is destroyed, aggressive and attack behavior is abolished (Karli & Vergness, 1969). Hence, the lateral hypothalamus is responsible for rage and aggressive behavior.

The lateral maintains an oppositional relationship with the medial hypothalamus. Hence, stimulation of the medial region counters the lateral area such that rage reactions are reduced or eliminated (Ingram, 1952; Wheately, 1944), whereas if the medial is destroyed there results lateral hypothalamic release and the triggering of extreme savagery.

Inflammation, neoplasm, and compression of the hypothalamus have also been noted to give rise to rage attacks (Pilleri & Poeck, 1965), and surgical manipulations or tumors within the hypothalamus have been observed to elicit manic and rage-like outbursts (Alpers, 1940). These appear to be release phenomenon, however. That is, rage, attack, aggressive, and related behaviors associated with the hypothalamus appears to be under the inhibitory influence of higher order limbic nuclei such as the amygdala and septum (Siegel & Skog, 1970). When the controlling pathways between these areas are damaged (i.e. disconnection) sometimes these behaviors are elicited.

For example, Pilleri and Poeck (1965) described a man with severe

damage throughout the cerebrum including the amygdala, hippocampus, cingulated, but with complete sparing of the hypothalamis who continually reacted with howling, growling, and baring of teeth in response to noise, a slight touch, or if approached. Hence, the hypothalamus being released responds reflexively in an aggressive-like non-specific manner to any stimulus. Lesions of the frontal-hypothalamic pathways have been noted to result in severe rage reactions as well (Fulton & Ingraham, 1929; Kennard, 1945).

THE AMYGDALA AND RAGE

Fear and rage reactions have also been triggered in humans following depth electrode stimulation of the amygdala (Chapman, 1960; Chapman et al., 1954; Heath et al. 1955; Mark et al. 1972). Mark et al. (1972) describe one female patient who following amygdaloid stimulation became irritable and angry, and then enraged. Her lips retracted, there was extreme facial grimmacning, threatening behavior, and then rage and attack—all of which persisted well beyond stimulus termination.

Similarly, Schiff et al. (1982) describe a man who developed intractable aggression following a head injury and damage (determined via depth electrode) to the amygdala (i.e. abnormal electrical activity). Subsequently, he became easily enraged, sexually preoccupied (although sexually hypoactive), and developed hyper-religiosity and psuedo-mystical ideas. Tumors invading the amygdala have also been reported to trigger rage attacks (Sweet et al. 1960; Vonderache, 1940).

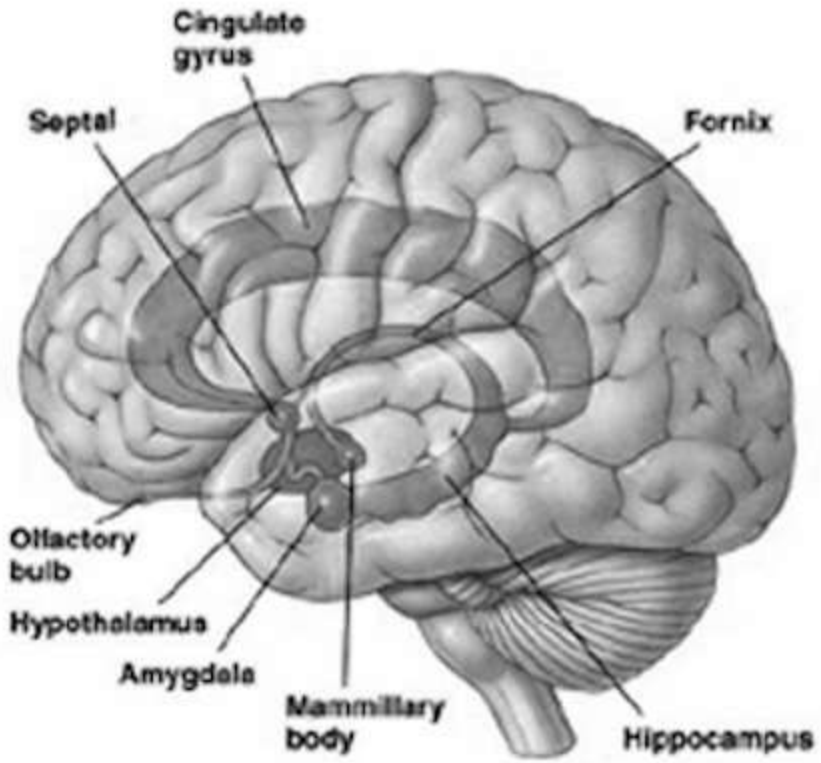
In many instances patients or animals will react defensively and with anger, irritation, and rage which seems to gradually build up until finally the animal or human will attack (Egger & Flynn, 1963; Gunne & Lewander, 1966; Mark et al., 1972 Ursin & Kaada, 1960; Zbrozyna, 1963). Unlike hypothalamic "sham rage," amygdaloid activation results in attacks directed at something real, or, in the absence of an actual stimulus, at something imaginary. There have been reported instances of patient's suddenly lashing out and even attempting to attack those close by, while in the midst of a temporal lobe seizure (Saint-Hilaire et al., 1980), and/or attacking, kicking, and destroying furniture and other objects (Ashford et al., 1980).

Moreover, rage and attack will persist well beyond the termination of the electrical stimulation of the amygdala. In fact, the amygdala remains

electrophysiologically active for long time periods even after a stimulus has been removed (be it external-perceptual, or internal-electrical) such that is appears to contine to process—in the abstract—information even when that information is no longer observable (O'Keefe & Bouma, 1969). The individual may therefore remain enraged or fearful long after the threat or offending party had departed the scene. The amygdala makes it possible to feel moody.

The amygdals appears capable of not only triggering and steering hypothalamic activity but acting on higher level neocortical processes so that individuals form emotional ideas. Indeed, the amygdala is able to overwhelm the neocortex and the rest of the brain so so that the person not only forms emotional ideas but responds to them, sometimes with vicious, horrifying results. A famous example of this is Charles Whitman, who in 1966 climbed a tower at the University of Texas and began to indiscriminantly kill people with a rifle (Whitman Case File # M968150. Austin Police Department, Texas, The Texas Department of Public Safety, File #4-38).

Charles Whitman climbed the University tower carrying several guns, a sawed off shotgun, and a high powered hunting rifle, and for the next 90 minutes he shot at everything that moved, killing 14, wounding 38. Post-mortem autopsy of his brain revealed a glioblastoma multiforme tumor the size of a walnut, erupting from beneath the thalamus, impacting the hypothalamus, extending into the temporal lobe and compressing the amygdaloid nucleus (Charles J. Whitman Catastrophe, Medical Aspects. Report to Governor, 9/8/66).



THE AMYGDALA, FEAR, AND THE LORD

"And now Israel, what does the Lord your god require of you, but to fear the Lord your god." Deuteronomy 10:12.

The amygdala in particular is exceedingly important in generating feelings of fear (Davis et al., 1997; Gloor, 1992, 1997; Halgren, 1992; Rosen & Schulkin 1998; Scott et al., 1997; Williams 1956) as well as sexuality, rage, and hunger. In this regard, feelings of religious awe may be based on fear (d'Aquili and Newberg 1993), rage, extreme, hunger, or sexual arousal. Fear, however, is often the most potent means of eliciting religious feeling, for even a committed atheist when confronted with the possibility of a horrifying death may cry out to god. The "Lord God" Yahweh, in fact, depends on fear, and glories in terrifying his subjects in order to reveal his presence and power:

"The beginning of wisdom is the fear of the Lord." -Proverbs 1:7, 9:10, 15:33.

"And now, Israel, what does the Lord your god require of you, but to fear the Lord your god." -Deuteronomy 10:12.

"God has come... in order that the fear of Him may be ever with you so

that you do not go astray." -Exodus 20:17.

THE FRONTAL-TEMPORAL LOBES

In addition to the amygdala, temporal lobe and hippocampus, d'Aquili and Newberg (1993) point out that the right frontal lobe also plays a significant role in the generation of mystical experience. It is thus noteworthy that the right frontal lobe can pray, swear, and curse "God" even when the (speaking) left cerebral hemisphere has been severely damaged and the patient is aphasic and can no longer speak (Joseph, 1982, 1988a, 1999a).

The right frontal and temporal lobe, hypothalamus, and amygdala also interact in regard to sexual arousal (Freemon & Nevis 1969; Joseph, 1986a, 1988a, 1992a, 1999a; MacLean 1969, 1990; Remmillard et al. 1983; Robinson & Mishkin 1968; Spencer et al., 1983). This is a very important relationship, and in part explains why (although there are exceptions), religions tend to be quite sexual and/or exceedingly concerned with sexual mores and related activity. As is well known, female pregnancy and matters pertaining to birth control and abortion are of extreme concern to most modern as well as ancient religions (Campbell 1988; Frazier 1955; Parrinder 1980; Smart 1969).

The limbic system as well as the frontal and temporal lobes are highly concerned with acting on or inhibiting aggression and murderous rage reactions which also arise in the limbic system (Joseph 1986, 1988, 1992a, 1996). This may also explain why many religious sects are so "righteously" belligerent and hateful and have employed torture, human or animal sacrifice, and sanctioned if not encouraged the murder of nonbelievers: What could be referred to as limbic-religious blood lust.

"Shed man's blood, by man your blood be shed." -Genesis 9:6.

SHED MAN'S BLOOD

The "Lord God," Yahweh, repeatedly required that the ancient Israelites undergo a bloody ritual of submission (e.g. Exodus 24:1-14), and in fact proscribed a ritual of incredible bloodiness for the investiture of his priests (Exodus 29: 1-46). This "Lord God" also required the slaughter and sacrifice of living creatures whose blood is splashed on his altar, and on his priests.

For example, upon the ratification of the covenant, twelve oxen were drained of their blood, one oxen for each of the 12 tribes of Israel, and as it

was splashed on the people, Moses says" This is the blood of the covenant that the Lord now makes with you concerning these commands" (Exodus 24:8). In yet another bloody ritual a bull is slaughtered then a ram, then yet another ram, and their blood is splashed and smeared on the altars, on the priests, and on the people, and climaxes with those who are being ordained as priests holding up bloody pieces of the body (Exodus 29: 10-28).

King Solomon slaughtered 22,000 oxen and 22,000 sheep as an offering to this "Lord God" whose loves meat, but not his vegetables.

In fact, as this "Lord God" is apparently a meat eater, this may explain why he criticized Cain, a tiller of the soil, and rejected his first harvest offering of fruit and vegetables that he had grown with his own hand (Genesis, 4):

"And in the process of time it can to pass that Cain brought of the fruit of the ground and offering until the Lord. And Abel, he also brought of the firstlings of his flock and the fat thereof. And the Lord had respect unto Abel and to his offering: But unto Cain and to his offering he had not respect." - Genesis 4.3-5.

For ancient hunters, aggression and the killing of animals (and other humans) was a way of life. Hunters often employed hunting magic and related religious rituals to insure success. Religion and murder, like religion and sex, are linked to the limbic system and evolved accordingly. Consequently, when in the throes of religious excitement, torture and murder may even receive the blessing or might be actively encouraged by one's "God."

The "Lord God" enjoys killing people, and informs Moses that even those who wish to convert should be slaughtered: "You shall make no covenant with them... " and "I will blot out their memory... The Lord will be at war with Amalek throughout the ages" (Exodus 17:14-16). This Lord God, will in fact engage in widespread ethnic cleansing and genocide, and will also impose a rein of terror on His own people (e.g., Exodus 32: 26-29, 35). The Lord God loves to spill the blood of innocent and guilty alike.

On the other hand, the blood sacrifice is also related to the worship of the goddess, the Great Mother of All. It is menstrual blood which issues from the womb, the source of all life, and the rites of the goddess cult involved sanctifying and splashing menstrual blood on the altar. Hence, many ancient patriarchal religions appear to have adopted this practice, with the notable

exception that instead of using the blood to celebrate life, the purpose of these bloody rituals was to evoke the power to take life which would be sacrificed to a warring, meat eating, God.

WARRIOR GODS: FEAR AND PANIC

Throughout history, many of the patriarchal Gods have been aggressive, jealous, conquering, angry and war-like e.g., Marduk, Mazda, Zeus, Apollo, Mars, and Yahweh "the Lord of hosts." For example, in addition to being described as the "Lord of hosts," Yahweh also means: "The Destroyer."

These warrior gods, including Yahweh, were prone to mass murder and extremely violent rages. Yahweh repeatedly threatened and engaged in the slaughter of enemies and believers alike, without ymercy or regard for women and children. Terror, war, and murder: the Lord God's middle names. "Terror, and the pit, and the snare are upon you, O inhabitant of earth (Isaiah 24:17). And as the Lord took delight in doing you good and multiplying you, so the Lord will take delight in bringing ruin upon you and destroying you (Deuteronomy 26:63). The Lord will bring a nation against you from afar, from the end of the earth, which will swoop down like the eagle... a ruthless nation, that will show the old no regard and the young no mercy (Deuteronomy 28:47-50). It shall devour the offspring... you shall eat your own issue, the flesh of your sons and daughters... until He has wiped you out... leaving you nothing... until it has brought ruin unto you..." (Deuteronomy 28:50-55).

"In the Name of God... by the Troops shall the unbelievers be driven towards Hell, until when they reach it, its gates shall be opened... for just is the sentence of punishment on the unbelievers... " Koran, XXXIX

"Behold I send an angel before thee, to keep thee in the way. Beware of him and obey his voice, for I will be an enemy unto thine enemies, and an adversary unto thine adversaries, and I will cut them off... .I will send my terror before thee, and will destroy all the people to whom thou shalt come... . and I will drive them out from before thee, until thou be increased and inherit the land." -Exodus 23:20-30

"...when you approach a town, you shall lay seizure to it, and when the Lord your god delivers it into your hand, you shall put all its males to the sword. You may, however, take as your booty the women, the children, the livestock, and everything in the town—all its spoils—and enjoy the spoil of

your enemy which the Lord your god gives you... In the towns of the people which the Lord your god is giving you as a heritage, you shall not let a soul remain alive." -Exodus 20:15-18; -Deuteronomy 20:12-16

"When Israel had killed all the inhabitants of Ai... and all of them, to the last man had fallen by the sword, all the Israelites turned back to Ai and put it to the sword...until all the inhabitants of Ai had been exterminated... and the king of Ai was impaled on a stake and it was left lying at the entrance to the city gate." -Deuteronomy 8:24-29.

In fact, the Lord God condemned even his most loyal followers if they dared to show even the slightest mercy even to animals (e.g., I Samuel 28:18-19). The Lord God, as described in the Old Testament, had what might best be described as a hair trigger temper, such that at the slightest sign of murmuring he would pounce and kill men, women, and children, the innocent and guilty alike including those of his own people. As is evident, for example, in the story of Exodus, the people were His prisoners, and He killed or insured that every adult who exited Egypt would die in the desert, including even Moses for making but one small mistake in following His orders: Instead of ordering a rock to give water, Moses tapped it with his cain. For this "sin," the Lord God kills Moses with a Divine kiss.

LIMBIC AND RELIGIOUS MASS MURDER: ETHNIC CLEANSING, AND GENETIC GENOCIDE

Led by Moses, and their "Lord God" the ancient Hebrews/Israelites murdered untold numbers, perhaps hundreds of thousands of innocent men, women, children, including even their livestock. These atrocities were committed against all manner of innocent peoples not because they had sinned, but because they happened to be along the path to the "promised land" and because they had the misfortune of living on land and possessing property that the "Lord God" wanted to give to his people.

"When the Lord they God shall bring thee into the land, and shall cast out many nations before thee, the Hittite, and the Gergashite, and the Amorite, and the Canaanite, and the Perizzite, and the Hivite, and the Jebusite... and the Lord thy god shall deliver them up before thee, and thou shalt smite them, then thou shall utterly destroy them."-Deuteronomy 7:1-2.

"Of the cities of these peoples, that the Lord they God giveth thee for an inheritance, thou shalt save alive nothing that breathest." -Deuteronomy,

20:16.

Moreover, “God” gloried not only in the murder of innocent women and children, but took special satisfaction in the theft of their property—the spoils of a godly-genocidal war. The Lord God believed that theft and injustice was a testament to his glory as a conquering warrior god.

“Great and goody cities, which thou didst not build and houses full of all good things which thou didst not fill, and cisterns hewn, which thou didst not hew, and vineyards and olive-trees, which thou didst not plant, and thou shalt eat and be satisfied.” -Deuteronomy 6:10-11.

Yahweh, the Lord of Hosts, the “Destroyer,” apparently so enjoyed the spectacle of mass murder, that once he began to kill He found it difficult to stop, killing everything and everyone, the guilty and the innocent, the righteous and the wicked, and even their animals. Apparently only blood and more blood, the signs of death, could protect the innocent, and cool his ardor for indiscriminate mass murder, which is why He explains to Moses that the only way to protect himself and the Jewish people from slaughter was by painting their doors red with blood: “When I see the blood” He informs Moses, “I will pass over you, and there shall be no plague upon you to destroy you, when I smite the land of Egypt” (Exodus 12:12-13).

It was only the sight of blood which prevented Yahweh from killing Moses almost immediately after informing him that he was to lead the Israelites out of Egypt.

“And the Lord said unto Moses...Go... And it came to pass by the way in the inn, that the Lord met him and sought to kill him. Then Zipporah” (the wife of Moses) “took a sharp stone and cut off the foreskin of her son, and cast it at his feet, and said, Surely a bloody husband art though to me.”

Why would the “Lord God” seek to kill his prophet? There are many possibilities, all of which may have provoked “Lord God’s” inherent murderous nature. For example, Moses dilly dallied and did not go directly to Egypt as he had been commanded. In addition, the “Lord God” may have been provoked to rage because Moses had failed to circumcise his son. Moses never did escape the wrath of the “Lord” for the “Lord God” kills Moses just as he and the Israelites are on the verge of entering the promised land.

THOU SHALT KILL AND KILL AND KILL

Despite the commandment “thou shall not kill” Yahweh kills and murders

the innocent and guilty alike and encourages and in fact orders the Israelites to murder even babies and women with children.

“And they warred... as the Lord commanded and slew all the males. And they slew the Kings... and they took all the women and their little ones... and they burnt all their cities wherein they dwelt, and all their goodly castles with fire... And Moses was wroth...and said unto them. Have ye saved all the women and the little ones alive? Now therefore kill every male among the little ones, and kill every woman that hath known man by lying with him.” (Numbers, 31).

As repeatedly detailed in Exodus, the “Lord God” purposefully and repeatedly “hardened Pharaoh’s heart” simply as an excuse for murdering innocent Egyptians, so that He could glory in the carnage.

“I will harden Pharaoh’s heart that I may multiply My signs and marvels in The land of Egypt. When the Pharaoh does not heed you, I will lay My hand upon Egypt.” -Exodus 7:3.

Moreover, it is not just Egyptians or the hapless innocents who the Israelites and their Lord God murder in their 40 years of wondering, but tens of thousands if not hundreds of thousands of Jews. The Lord God kills them for rebelling, He kills them for “murmuring,” He kills them for complaining, He kills them for questioning. And He kills their wives, brothers, fathers, mothers, and children: “Go forth and slay brother, neighbor, and kin” (Genesis, 32:26-29).

For example, when Moses ascended the Mountain to meet with the Lord God, the Israelites grew impatient with the hardships and murders they were forced to endure, and they turned again to worshipping the scared goddess, as represented by the golden calf. In reaction, Yahweh thunders and his prophet Moses proclaims that innocent and guilty alike shall be murdered: “Put ye every man his sword upon his thigh and slay every man...his brother, and every man his companion, and every man his neighbor and kin” (Genesis, 32:26-29).

When Moses proclaimed the Israelites a “nation of priests,” some of the Israelites then dared to ask: if “Every member of the community is holy and the Lord is among them all... Why do you set yourselves up above the assembly of the Lord?” The response? Those who dared to ask questions are killed, including their wives, children, brothers and neighbors: “And the Earth opened her mouth and swallowed them” (Numbers, 16:32).

The ancient Israelis not only received special permission from their "Lord God" to murder wayward Jews, non-Jews and Jewish nonbelievers, including women and children whom they slaughtered without mercy (e.g. Numbers, 3115-18; Numbers 34, 50-53), but even Jewish babies. Indeed, it was a Hebrew religious-tradition to kill and slaughter not only non-Jewish males in general but first born Jewish sons (a custom until the time of Moses, e.g. Bergmann 1992).

SACRIFICIAL MURDERS

Human sacrifice was a common feature of many ancient religions, and serves as one of the founding stones of Christianity: The Lord God's sacrifice of his son, Jesus, on the Cross. Hence, it is said that "Christ died for your sins." Christ was sacrificed as an offering to the Lord God, so as to wash away the sins of the masses—or so claims the Roman Catholic Church.

The Lord God showed a particular fondness for killing first born sons, including the first born of the ancient Egyptians, as well as his own people.

"A blessing on him who seizes your babies and dashes them against rocks." -Psalm 137:9).

"I polluted them with their own offerings, making them sacrifice all their firstborn, which was to punish them, so that they would learn that I am Yahweh." -Ezekiel 20:25-36; 22:28-29.

This "Lord God" even required the death of the first born son of King David and his wife Bethsheba, despite the fact that He claimed to have loved David most dearly. However, by killing this little boy, "God" in effect pardoned King David for repeatedly breaking two of His commandments, i.e., murder (of Bethsheba's husband) and adultery. Thus, the son of David was sacrificed by the Lord God so as to cleanse David of his sins, including, perhaps his sinful propensity for having sex with other men's wives (e.g. Abigail wife of Nabal, and Michal wife of Paltiel). However, David the murderer and adulterer, was also a fierce warrior who had killed tens of thousands, including even tens of thousands of Jews—and this "Lord God" loved him most dearly.

Sacrificial murder, therefore, is a way of indicating atonement, and for obtaining favor from one's god, including the Lord God. For thousands of years it has been a world wide religious custom to sacrifice captured warriors, young virgins, and especially children.

In some ancient societies children were killed because they were "pure" and precious. Thus the death of these innocent children could be considered a true sacrifice. Moreover, the ancient gods, including Yahweh, required that those murdered in their glory, be pure and without blemish. Children, and virgins, therefore, were a natural choice.

First born sons in particular were singled out for this honor as many ancient religions held to the belief that the first born was the offspring of a god who had opened the womb and impregnated the mother. This belief may even have caused the Lord God some consternation, for he not only required the killing of the first born, but he repeatedly shows favor to second born sons, e.g., Abel over Cain, Isaac instead of Ishmael, Jacob instead of Esau, Ephram over Manasseh, Solomon the second born son of David and Bethsheba, and so on.

It was also believed by many pagan groups that because a god may have impregnated the mother, the god also lost some of his lifeforce in the process. Hence, the first born would be killed to liberate that energy which could then be absorbed by the god.

It may well have been because of these beliefs that other gods were absorbing this life force, that the Lord God, although at first demanding the sacrifice of first born sons, later changed His mind, and condemned the practice:

"This very day you defile yourselves in the presentation of your gifts by making your children pass through the fire of all your fetishes." -Ezekiel 20:31.

CHRISTIAN HOLY WARS KILL THEM ALL: GOD WILL RECOGNIZE HIS OWN

It was upon these images of the murdering warrior God, the Lord of Hosts, that Pope Urban II proclaimed that war for the sake of God was holy. Thus, the Catholic Popes instigated numerous Crusades and inquisitions. In consequence hundreds of thousands of Moslems, Jews, and women and children, were sexually tortured, slaughtered, spitted, and roasted alive, and their cities and villages pillaged and set ablaze. All in the name of the Lord God. So intense was their limbic blood lust that even Christians were murdered.

For example, in the 13th Century an army of some thirty thousand

Christian knights and Crusaders descended into southern France and attacked the town of Beziers in search of heretics. Over thirteen thousand Christians flocked to the churches for protection. When the Bishop, one of the Pope's representatives, was informed that the army was unable to distinguish between true believers and heretics, he replied, "Kill them all. God will recognize his own."

However, in order to recruit those worthy of such a glorious and murderous undertaking, the Pope had to appeal to murderers, rapists, molesters of children, and those who enjoyed the prolonged torture of their victims.

"You oppressors of orphans, you robbers of widows, you homicides, you blasphemers, you plunderers of others' rights... If you want to take counsel for your souls you must go forward boldly as knights of Christ..." so proclaimed the Pope who offered "indulgences" and forgiveness to all those who would commit blasphemies and murder women and children in the name of the Lord God and Jesus Christ.

As summed up by Henry Charles Lea: "Protestants and Catholics rivaled each other in the madness of the hours... Christendom seemed to have grown delirious, and Satan might well have smiled at the tribute to his powers seen in the endless smoke of the holocaust which bore witness to his triumph over the Almighty."

Again, however, although "Lord God" of the "Old Testament" repeatedly approved of mass murder and rape, and in fact employed these practices against His own people, Jesus Christ obviously did not preach mass murder, torture, rape, pedophilia, and the castration of young boys: "But love ye your enemies and do good and lend, hoping for nothing and your reward shall be great. Be ye merciful...judge not, and ye shall not be judged: condemn not and ye shall not be condemned: forgive and ye shall be forgiven" (Luke, 7: 35-37); "For the Son of man is not come to destroy men's lives, but to save them" (Luke 10: 56; however, see Matthew 10:16 vs 34-35).

Nevertheless, despite the teaching of Christ, the Catholic Church fully approved of castration, mass murder, and the most horrible of tortures. Indeed, as is well known, the Spanish and Catholic missionaries, acting at the behest of the Catholic Popes (and their Spanish/Catholic Sovereigns), continued these Satanic practices once they invaded the America's during the 1500's and up through the 19th century.

As the Catholic Dominican Bishop Bartolom de Las Casas reported to the Pope: the Aztec and Indian natives were hung and burnt alive "in groups of 13... thus honoring our Savior and the 12 apostles." However, because some of the various victims managed to live throughout the night, the Dominican priests ordered that sticks be shoved down their throats so the soldiers and priests would not be kept awake at night by their cries and moans.

Of course the Aztecs did not practice a benign form of worship, for they tore the beating hearts from their victims in order to please their God (Carrasco 1990) and they killed thousands if not hundreds of thousands in so doing.

Similarly, many Indian tribes of the Mississippi valley practiced human sacrifice as did the ancient Jews, Europeans, and leaders of the Protestant Reformation who urged the killing of anyone and everyone who did not agree with their interpretation of the Bible, including fellow Christians:

"Therefore let everyone who can smite, slay, and stab, secretly or openly, remembering that nothing can be more poisonous, hurtful, or devilish that a rebel. It is just as when one must kill a mad dog; if you do not strike him he will strike you, and a whole land with you." -Martin Luther.

What is the origin of these sadistic religious practices? The human limbic system. And, we should recall: the limbic system is concerned not just with sex and violence, but resources, such as food, water, land, and thus territory.

HOLY WAR: OSAMA BIN LADEN, MOHAMMED ATTA & 9/11

It was thirteen hundred years ago, in the seventh century A.D., that the religion known as Islam arose in the Arabian peninsula. With astonishing rapidity, it quickly spread across and conquered the Middle East, Byzantium, Persia, northern Africa, and Spain.

Islam was spread by the sword.

The armies of the Christian Byzantine Empire were annihilated in 636, and Jerusalem fell in 638. Four hundred years later, in the year 1095, the Catholic Pope Urban II called upon the nobility and their armies to go to forth and assist their Christian brothers, the Byzantines, and kill the Muslims in the name of God—a cause that could be justified by scripture:

"Behold I send an angel before thee, to keep thee in the way. Beware of him and obey his voice, for I will be an enemy unto thine enemies, and an adversary unto thine adversaries, and I will cut them off... I will send my

terror before thee, and will destroy all the people to whom thou shalt come... and I will drive them out from before thee, until thou be increased and inherit the land." Exodus 23:20-30

However, it was not the pious that Urban desired to fight his wars, but lovers of murder and mayhem. He required killers to do a killer's job. He was interested in recruiting for his holy cause only those who were murderers, rapists, molesters of children and anyone who enjoyed the prolonged torture of their victims.

He had just launched the first crusade.

An important factor that played a role in helping to persuade the nobles and their armies to participate in such a gruesome task so terribly far from home, were the offers of an "indulgence." An "indulgence" was literally a license to sin, to do harm, and it was a guarantee that all sins would be forgiven by god, no matter how odious the crime.

In consequence, the crusaders not only attacked and massacred the Muslims, successfully retaking Jerusalem on July 15, 1099, but they massacred their fellow Christians who had the misfortune and bad luck of living in villages that fell along the way—a pattern that was repeated in subsequent Crusades over the centuries.

The Muslims viewed the Christians as "polytheists," and idolaters, and set out to cleanse the Holy lands of these blasphemers.

The Islamic Holy Wars and Counter-Crusades began.

Saladin was the greatest of Muslim generals, and in 1187, he annihilated the entire army of the Kingdom of Jerusalem at the Horns of Hattin, near the Sea of Galilee. Jerusalem had again come under Islamic rule.

Now after nearly a thousand, the "crusader forces" had returned and whereas the Medieval Catholic Church had been driven back and had failed to defeat the Muslim peoples, the United States had succeeded greatly. During the Gulf War America had invaded the holiest of all Muslim lands, the land of Mecca, the Holy land of Saudi Arabia—which was an intolerable affront to 1,400 years of Islamic tradition. It was an afront to Allah, to god.

Over a thousand years ago, after driving out the polytheists and those who worshipped multiple gods and those who profaned the lands of Arabia, the prophet Muhammad had declared that hencefore there shall "not be two religions in Arabia."

Muhammad's words were law—he was the messenger of God.

And now, a thousand years later, the polythiests, the Crusaders had returned.

The presence of foreign troops, with their many gods, was blasphemous. It was a sin. It was a crime against god.

The American led, Western "crusader forces," of course, saw their presence in a whole different light. They were not the invaders. They were in Saudi Arabia to protect it from Saddam Hussein's armies and to liberate Kuwait.

From the perspective of the Americans, they were not an occupying force but remained stationed in Saudi Arabia after the Gulf War, in order to protect the kingdom from Saddam Hussein.

It was not just entirely on religious grounds that bin Laden and other Arabs were incensed. They also believed the presence of the "Crusader Forces" were corrupting the morals of the people and causing the kingdom of Saudi Arabia incredible economic and financial harm.

"The crusader forces became the main cause of our disastrous condition," bin Laden wrote in his 1996 declaration of jihad which read, in part, as follows:

"DECLARATION OF WAR AGAINST THE AMERICANS OCCUPYING THE LAND OF THE TWO HOLY PLACES: EXPEL THE INFIDELS FROM THE ARAB PENINSULA. A MESSAGE FROM USAMA BIN MUHAMMAD BIN IN LADEN"

"Praise be to Allah, we seek His help and ask for his pardon. we take refuge in Allah from our wrongs and bad deeds. Who ever has been guided by Allah will not be misled, and who ever has been misled, he will never be guided. I bear witness that there is no God except Allah, and I bear witness that Muhammad is His slave and messenger.

"It should not be hidden from you that the people of Islam had suffered from aggression, iniquity and injustice imposed on them by the Zionist-Crusaders alliance and their collaborators; to the extent that the Muslims blood became the cheapest and their wealth as loot in the hands of the enemies. Their blood was spilled in Palestine and Iraq. The horrifying pictures of the massacre of Qana, in Lebanon are still fresh in our memory. Massacres in Tajakestan, Burma, Cashmere, Assam, Philippine, Fatani, Ogadin, Somalia, Erithria, Chechnia and in Bosnia-Herzegovina took place, massacres that send shivers in the body and shake the conscience. All of this

and the world watch and hear, and not only didn't respond to these atrocities, but also with a clear conspiracy between the USA and its' allies and under the cover of the iniquitous United Nations, the dispossessed people were even prevented from obtaining arms to defend themselves.

"The people of Islam awakened and understood that they were the main targets for the aggression of the Zionist-Crusaders alliance. All false claims and propaganda about "Human Rights" were hammered down and exposed by the massacres that took place against the Muslims in every part of the world.

"The latest and the greatest of these aggressions, incurred by the Muslims since the death of the Prophet (ALLAH'S BLESSING AND SALUTATIONS ON HIM) is the occupation of the land of the two Holy Places -the foundation of the house of Islam, the place of the revelation, the source of the message and the place of the noble Ka'ba, the Qiblah of all Muslimsby the armies of the American Crusaders and their allies. (We bemoan this and can only say: "No power and power acquiring except through Allah")....

"Traitors implement the policy of the enemy in order to bleed the financial and the human resources of the Ummah, and leave the main enemy in the area-the American Zionist alliance enjoy peace and security! This is the policy of the American-Israeli alliance as they are the first to benefit from this situation.

"But with the grace of Allah, the majority of the nation, both civilians and military individuals are aware of the wicked plan. They refused to be played against each other and to be used by the regime as a tool to carry out the policy of the American-Israeli alliance through their agent in our country: the Saudi regime.

"If there are more than one duty to be carried out, then the most important one should receive priority. Clearly after Belief (Imaan) there is no more important duty than pushing the American enemy out of the holy land.

"Ibn Taymiyyah, after mentioning the Moguls (Tatar) and their behavior in changing the law of Allah, stated that: the ultimate aim of pleasing Allah, raising His word, instituting His religion and obeying His messenger (ALLAH'S BLESSING AND SALUTATIONS ON HIM) is to fight the enemy, in every aspects and in a complete manner; if the danger to the religion from not fighting is greater than that of fighting, then it is a duty to

fight them even if the intention of some of the fighter is not pure i.e. fighting for the sake of leadership (personal gain) or if they do not observe some of the rules and commandments of Islam. To repel the greater of the two dangers on the expense of the lesser one is an Islamic principle, which should be observed. It was the tradition of the people of the Sunnah (Ahlul-Sunnah) to join and invadefightwith the righteous and non-righteous men. Allah may support this religion by righteous and non-righteous people as told by the prophet (ALLAH'S BLESSING AND SALUTATIONS ON HIM). If it is not possible to fight except with the help of non-righteous military personnel and commanders, then there are two possibilities: either fighting will be ignored and the others, who are the great danger to this life and religion, will take control; or to fight with the help of non righteous rulers and therefore repelling the greatest of the two dangers and implementing most, though not all, of the Islamic laws...."

In February of 1998, bin Laden published a second declaration of war: Ladenese Epistle.

OSAMA BIN LADEN DECLARES WAR (JIHAD) AGAINST JEWS & THE CRUSADERS

"Praise be to God, who revealed the Book, controls the clouds, defeats factionalism, and says in His Book: "But when the forbidden months are past, then fight and slay the pagans wherever ye find them, seize them, beleaguer them, and lie in wait for them in every stratagem (of war)"; and peace be upon our Prophet, Muhammad Bin-'Abdallah, who said: I have been sent with the sword between my hands to ensure that no one but God is worshipped, God who put my livelihood under the shadow of my spear and who inflicts humiliation and scorn on those who disobey my orders.

"The Arabian Peninsula has never — since God made it flat, created its desert, and encircled it with seas — been stormed by any forces like the crusader armies spreading in it like locusts, eating its riches and wiping out its plantations. All this is happening at a time in which nations are attacking Muslims like people fighting over a plate of food. In the light of the grave situation and the lack of support, we and you are obliged to discuss current events, and we should all agree on how to settle the matter.

"No one argues today about three facts that are known to everyone; we will list them, in order to remind everyone:

“First, for over seven years the United States has been occupying the lands of Islam in the holiest of places, the Arabian Peninsula, plundering its riches, dictating to its rulers, humiliating its people, terrorizing its neighbors, and turning its bases in the Peninsula into a spearhead through which to fight the neighboring Muslim peoples.

“If some people have in the past argued about the fact of the occupation, all the people of the Peninsula have now acknowledged it. The best proof of this is the Americans’ continuing aggression against the Iraqi people using the Peninsula as a staging post, even though all its rulers are against their territories being used to that end, but they are helpless.

“Despite the great devastation inflicted on the Iraqi people by the crusader-Zionist alliance, and despite the huge number of those killed, which has exceeded 1 million... despite all this, the Americans are once against trying to repeat the horrific massacres, as though they are not content with the protracted blockade imposed after the ferocious war or the fragmentation and devastation.

“So here they come to annihilate what is left of this people and to humiliate their Muslim neighbors.

“If the Americans’ aims behind these wars are religious and economic, the aim is also to serve the Jews’ petty state and divert attention from its occupation of Jerusalem and murder of Muslims there. The best proof of this is their eagerness to destroy Iraq, the strongest neighboring Arab state, and their endeavor to fragment all the states of the region such as Iraq, Saudi Arabia, Egypt and Sudan into paper statelets and through their disunion and weakness to guarantee Israel’s survival and the continuation of the brutal crusade occupation of the Peninsula.

“All these crimes and sins committed by the Americans are a clear declaration of war on God, his messenger and Muslims. And ulema have throughout Islamic history unanimously agreed that the jihad is an individual duty if the enemy destroys the Muslim countries. This was revealed by Imam Bin-Qadamah in “AlMughni,” Imam al-Kisa’i in “Al-Bada’i,” al-Qurtubi in his interpretation, and the shaykh of al-Islam in his books, where he said: “As for the fighting to repulse [an enemy], it is aimed at defending sanctity and religion, and it is a duty as agreed [by the ulema]. Nothing is more sacred than belief except repulsing an enemy who is attacking religion and life.”

“On that basis, and in compliance with God’s order, we issue the

following fatwa to all Muslims:

"The ruling to kill the Americans and their allies — civilians and military — is an individual duty for every Muslim who can do it in any country in which it is possible to do it, in order to liberate the al-Aqsa Mosque and the holy mosque [Mecca] from their grip, and in order for their armies to move out of all the lands of Islam, defeated and unable to threaten any Muslim. This is in accordance with the words of Almighty God, "and fight the pagans all together as they fight you all together," and "fight them until there is no more tumult or oppression, and there prevail justice and faith in God."

"This is in addition to the words of Almighty God: "And why should ye not fight in the cause of God and of those who, being weak, are ill-treated (and oppressed)? — women and children, whose cry is: 'Our Lord, rescue us from this town, whose people are oppressors; and raise for us from thee one who will help!'"

"We — with God's help — call on every Muslim who believes in God and wishes to be rewarded to comply with God's order to kill the Americans and plunder their money wherever and whenever they find it. We also call on Muslim ulema, leaders, youths and soldiers to launch the raid on Satan's U.S. troops and the devil's supporters allying with them, and to displace those who are behind them so that they may learn a lesson.

"Almighty God said: "O ye who believe, give your response to God and His Apostle, when He calleth you to that which will give you life. And know that God cometh between a man and his heart, and that it is He to whom ye shall all be gathered."

"Almighty God also says: "O ye who believe, what is the matter with you, that when ye are asked to go forth in the cause of God, ye cling so heavily to the earth! Do ye prefer the life of this world to the hereafter? But little is the comfort of this life, as compared with the hereafter. Unless ye go forth, He will punish you with a grievous penalty, and put others in your place; but Him ye would not harm in the least. For God hath power over all things."

"Almighty God also says: 'So lose no heart, nor fall into despair. For ye must gain mastery if ye are true in faith.'"

In 1998, bin Laden announced his intentions to the world and the United States and called for the killing of "Americans and their allies, civilians and military . . . in any country in which it is possible to do it."

In 1998, U.S. targets were hit: the U.S. embassies in East Africa and the

USS Cole in Aden, Yemen.Years of planning went into the 1998 bomb attacks—just as bin Laden promised. “The nature of the battle requires good preparation.”

In 1998, he also promised that “the battle will inevitably move . . . to American soil.”

In June of 2001, Osama bin Laden boasted that a horrific attack would soon take place in the United States.

“To all the Mujah: Your brothers in Palestine are waiting for you; it’s time to penetrate America and Israel and hit them where it hurts the most.”

On September 11, 2001, he made good on his terrorist threat. His Al-Qaeda terrorist organization murdered nearly 3,000 Americans.

On the morning of September 11. 2001, Mohammed Atta and 18 other Muslim terrorists, hijacked 4 commerical jets, two of which struck the World Trade Center, the others crashing into the Pentagon and a field in Pennsylvania.

Although Atta had repeatedly rehearsed this operation, on the morning of September 11, he was so worried that he might miss his flight from Maine to Boston that he rushed out and forgot his luggage. Later FBI agents would discover a jet fuel consumption calculator, an instructional video on flying commercial jets, a scrap of lined paper with a list of helpful hijacker hints, a letter, dated from 1996, and a kind of Hijacker’s epistle.

In the notes and letter he left behind, Atta said he planned to kill himself so he would go to heaven as a martyr.

He also wrote out a page of last minute reminders which he may have photocopied and circulated among his followers. Atta, the presume author, had doodled on the paper, sketching a crude “key of life” that consisted of a arrowhead-like sword, with serpentine swirls and two hoops circling the shaft.

The letter also said in part:

“It is a raid for Allah....When the time of truth comes and zero hour arrives, then straighten out your clothes, open your heart and welcome death for the sake of Allah. Seconds before the target, your last words should be: There is no God but Allah. Mohammed is his messenger. I pray to you, God, to forgive me from all my sins, to allow me to glorify you in everypossible way.”

The FBI also found a detailed letter, a kind of Hijacker’s Epistle which

had apparently been circulated among all four hijacker teams, for a copy was also found in the debris of yet another hijacked jetliner.

It read in part as follows:

"In the name of God, the most merciful, the most compassionate. . . . In the name of God, of myself and of my family . . . I pray to you God to forgive me from all my sins, to allow me to glorify you in every possible way..."

"Remember the battle of the prophet . . . against the infidels, as he went on building the Islamic state..."

And then, on the top of page 3, it was captioned: "The last night."

"Remind yourself that in this night you will face many challenges. But you have to face them and understand it 100 percent."

"Obey God, his messenger, and don't fight among yourself where you become weak, and stand fast, God will stand with those who stood fast."

"You should engage in such things, you should pray, you should fast. You should ask God for guidance, you should ask God for help. . . . Continue to pray throughout this night. Continue to recite the Koran."

"Purify your heart and clean it from all earthly matters. The time of fun and waste has gone. The time of judgment has arrived. Hence we need to utilize those few hours to ask God for forgiveness. You have to be convinced that those few hours that are left you in your life are very few. From there you will begin to live the happy life, the infinite paradise. Be optimistic. The prophet was always optimistic."

"Always remember the verses that you would wish for death before you meet it if you only know what the reward after death will be."

"Everybody hates death, fears death. But only those, the believers who know the life after death and the reward after death, would be the ones who will be seeking death."

"Remember the verse that if God supports you, no one will be able to defeat you."

"Keep a very open mind, keep a very open heart of what you are to face. You will be entering paradise. You will be entering the happiest life, everlasting life. Keep in your mind that if you are plagued with a problem and how to get out of it. A believer is always plagued with problems. . . . You will never enter paradise if you have not had a major problem. But only those who stood fast through it are the ones who will overcome it."

"Check all of your items, your bag, your clothes, knives, your will, your

IDs, your passport, all your papers. Check your safety before you leave. . . . Make sure that nobody is following you. . . . Make sure that you are clean, your clothes are clean, including your shoes."

"In the morning, try to pray the morning prayer with an open heart. Don't leave but when you have washed for the prayer. Continue to pray." "When you arrive ... smile and rest assured, for Allah is with the believers and the angels are protecting you." "When you enter the plane pray:

"Oh God, open all doors for me. Oh God who answers prayers and answers those who ask you, I am asking you for your help. I am asking you for forgiveness. I am asking you to lighten my way. I am asking you to lift the burden I feel."

"Oh God, you who open all doors, please open all doors for me, open all venues for me, open all avenues for me."

"God, I trust in you. God, I lay myself in your hands. I ask with the light of your faith that has lit the whole world and lightened all darkness on this earth, to guide me until you approve of me. And once you do, that's my ultimate goal."

"There is no God but God. There is no God who is the God of the highest throne, there is no God but God, the God of all earth and skies. There is no God but God, I being a sinner. We are of God, and to God we return."

THE SUICIDE BOMBER

The suicide bomber is stereotypically highly religious, a loner with few social skills, depressed, withdrawn, and often confused about their sexuality (Jess, et al., 2001, Jess & Beck, 2002). He who volunteers to destroy himself and others with a bomb strapped to his back, generally faces a future that offers little hope. He (or she) often feels overwhelmed by hopelessness and defeat as well as by feelings of terrible rage and anger.

The suicide bomber is not interested in killing soldiers, but civilians. He has no qualms, nor issues about destroying the innocent. Women and children are viable, desirable targets. By bringing the war off the battlefield and into the homes, work and public spaces of the innocent, the suicide bomber tries to spread so much terror that the enemy, who they call Israel and America, will withdraw from their lands and capitulate, as capitulation offers the possibility of salvation.

The suicide bomber seeks revenge and salvation--often for imaginary sins,

including the “sin” of homosexuality (Jess, et al., 2001, Jess & Beck, 2002). The suicide bomber believes that through hatred and violence, by murdering innocent people, he is fulfilling a moral and spiritual quest that will lead to martyrdom and paradise.

Most suicide bombers are highly religious. Prospects are recruited from mosques and religious institutions and are led to believe that by killing themselves and others, they will go straight to paradise, where they will be seated in honor, next to their almighty God.

According to Islamic tradition, and as taught by “suicide teacher” Mohammed el Hattab, “He who gives his life for Islam will have his sins forgiven and will attain the highest state of paradise.” And what is paradise? 72 virgins who will love him and him alone. Eternal sexual bliss is one of the rewards of martyrdom.

Suicide bombers are commonly recruited by and are affiliated with the Palestinian militant group Hamas (or Islamic Jihad).

They are recruited from mosques and schools. It is not the brave and courageous who are enticed, but those who appear lonely, troubled, shy and withdrawn—those who might leap at the chance to be accepted, to be part of a group, to be given a mission in life, to feel important, and to belong.

Suicide bombers from the Middle East are typically young, impressionable, often highly religious, and living in despair and hopeless poverty. They are loners. They are shy, awkward, and usually have few or no friends. In American slang, they are the “losers.” They are young men with nothing to lose and everything to gain: Paradise and 72 willing virgins.

And like many virgins and young men confused about their sexuality, these “losers,” are often seduced by older men, who offer camaraderie and the chance to feel wanted, to belong and to have friends, if only the young man will agree to kill himself.

Friendly, awkward, shy and alone, these young men are easy pickings for those sophisticated in the art of enticing the friendless with gifts of kindness, respect and yes, even love, brotherly love.

The recruiters, these older men wise in the world, offer the “loser” a chance to become an accepted, respected member of the gang, part of an elite brotherhood: A brotherhood in blood.

Perhaps at many as half of the 19 men who agreed to kill themselves and thousands of others on September 11, were mentally disturbed and confused

about their sexuality.

Wail Alshehri, for example, suffered from significant "psychological problems" that required treatment. Abdulaziz Alomari was an alcoholic. He had at least one arrest for drunk driving.

Ahmed Salah Alghamdi, was highly religious, the graduate of a religious school, and he suffered from the torment of sin. He knew himself to be a sinner. He was wracked by a pathological, almost delusional guilt, frequently asking others, such as his parents, to pray for him. Highly religious, mentally disturbed, and drowning in self-hate.

Some would agree to murder and destroy Americans, only because they were seeking to destroy their own unknown face.

As detailed in the book, America Attacked (Jess et al., 2001), Mohammed Atta was centrally involved in possibly all phases of the 9/11 attack, including planning, spying, recruitment and training. Atta may have also been a self-hating homosexual.

Atta was a religious man, which is a common characteristic of those who carry out suicide attacks. Yet, Atta differed from the stereotypical suicide attacker in that he was older, 33, highly educated and technically skilled. He also came from a well to do family and could be considered "upwardly mobile."

In many respects he was no different from any other "upwardly mobile" highly educated Muslim. But there were also several notable exceptions. Atta drank alcohol excessively and he enjoyed hanging out at bars, including Sharky's Billiard Bar in Hamburg where he was attending the Technical University in 1996.

He also preferred the company of men to women and his goal in life was to launch a suicidal attack and murder thousands of people who had never caused him or his loved ones harm.

Mohammed Atta, was a religious man. His teachers described him as polite, diligent, intelligent and very religious, perhaps fanatically so. Yet he was also a sinner who loved fast cars, flashy clothes, young men and money, lots and lots of money. Mohammed Atta knew himself to be a sinner. He desperately sought redemption, turning first to religion, and then failing that, or perhaps, because of it, embracing suicide and mass murder in order to achieve martyrdom and to wash away his guilty sins. Mohammed Atta was also a leader. He played a leadership role in Hamburg and again in the United

States.

Young men were attracted to Mohammed Atta and many were seduced and convinced to join his army, including fellow hijackers, Marwan Al-Shehhi, Saeed Alghamdi and Ziad Jarrahi—men he met and "seduced" in Hamburg.

Together they were to do battle with the enemies of Islam and their reward would be paradise and the cleansing of their guilty sins.

Mohammed Atta saw himself as a soldier and he would lead his men on a journey to eternity and paradise.

In 1996, Atta demanded that University officials accommodate his religious needs. He convinced them to establish an Islamic prayer room for himself and 20 other Muslim students.

Atta, the seductress, began recruiting others to the cause. Arabic men not only attended his prayer room sermons but would gather late at night at his home.

Atta held meetings in the prayer room and in his home and soon found a willing convert, Marwan Al-Shehhi, who was 11 years his junior. Marwan Al-Shehhi, was not just a convert, he moved into Atta's apartment and formed an unusual relationship that was to last until the day they died.

The two men became "inseparable" and "joined at the hip."

They lived together. They trained together. They worked out together. They drank together. They committed mass murder together. The only thing they didn't do together was seek out women. They had no interest in women. They did not like women. Atta, in fact, hated women and left instructions that women should not be allowed to attend his funeral.

In America and Europe, when two men form close, physical, "inseparable" relationships, and eschew the company of females, few eyebrows are raised even when it becomes clear the men are homosexuals.

In more conservative Islamic countries, it is also not uncommon for men to spend a lot of time together and to even live together. That two highly religious men might also become inseparable and eschew the company of women, would be viewed as a sign of virtue and no cause for alarm.

However, if the same two inseparable Arab men liked to drink, wear expensive fancy clothes and spend time on the town, but also eschewed the company of women, such behavior would be recognized for what it is, and would not be tolerated. It would have been viewed as "immoral." Sinful. In

many Muslim countries, they could be legally killed and stoned to death.

Al-Shehh was also a problem drinker. In Florida he and Atta frequented a number of bars and were often observed to down four or five drinks in a row. Their favorite "poisons" included rum and Coke and Stolichnaya vodka and orange juice.

If they were Osama bin Laden's men, they didn't act like it. Bin Laden would not let his boys smoke cigarettes. Drinking alcohol would have led to banishment from the ranks of his al-Qa'eda movement.

However, as we now know, in 1996 bin Laden made an exception. He welcomed sinners into the ranks of his fighters. He would even finance their sins.

Were the two men homosexuals? We don't know.

What we do know is that Mohamed Atta and Marwan Al-Shehhi were fashion conscious, they enjoyed wearing expensive clothes, and were provided with large sums of money to indulge these habits. They also spent time keeping their bodies pretty by working out together at gyms.

They were always together. The lived together. They were inseparable.

Indeed, these two men remained "bound at the hip" until the day they boarded separate planes in Boston and hijacked them to New York City.

That they were both highly religious, Mohammed Atta in particular, does not rule out homosexuality. It certainly didn't rule out mass murder. Rather their brand of religiosity leads credence to the possibility that these two fashion conscious, inseparable, unmarried men may have harbored "forbidden" tendencies, even if they never acted on them.

These forbidden tendencies may have also been the lure, which attracted and then bound so many young men to Atta's camp. These same guilty, sinful tendencies may have had the motive force, which drove them to commit suicide and mass murder—devilish deeds that would cleanse them of their sins, even if they had never acted on them.

Mohammed Atta, while he was in Hamburg, Germany, had taken on the role of a cleric, of a priest! In was in this clerical-type shepherd role that he was able to gather so many sheep.

Homosexuality is common among clerics, shamans and priests. In the United States, homosexuality was so rampant within the ministry of the Episcopal church and its homosexual clergy so openly promiscuous that the church lost over 5 million members by 1997.

Likewise, and as will be detailed later in this chapter, the priesthood of the Catholic Church also includes a high percentage of homosexuals and pedophile priests who rape young men and boys. For example, in 1999, the Bishop of the Santa Rosa Diocese in California was forced to resign because another priest, a younger man, accused the Bishop of repeatedly raping him. In 2000, the Catholic Church decreed that priests could no longer be alone with altar boys, because of the possibility these older men would seduce their young charges.

In Hamburg, Mohammed Atta also served a priestly role. He gathered young and highly intelligent Muslim men who were alone, friendless and isolated, and bound them to him and his cause. He was a seductress.

Ziad Jarrah was seduced. He soon began living together with Mohammed Atta and Marwan Al-Shehhi in the same apartment—an arrangement that astonished his father, Samir Jarrah, when he learned of it.

This unusual relationship also put a strain on Ziad's relationship with his fiance, Asle. Although they were to get married, Ziad became so entangled with his new friends that he no longer had time to see her. He was so busy that when it came time for Asle to meet his parents, he could not find the time to accompany her.

Too busy to bring his fiance to meet his family?

Ziad Jarrah had been seduced. He not only lived with the two men but he died with them. On September 11, he helped to commandeer and then to pilot one of the four hijacked planes.

When Ziad Jarrah moved in with Mohammed Atta and Marwan Al-Shehhi, the Jarrah family realized that something was terribly wrong with their only son.

He was living with two men in a small apartment when he had more than enough money to live alone. His relationship with his fiance grew more and more estranged. He was behaving strangely. He was preoccupied. He seemed moody and depressed.

What was wrong with Ziad? His family did not know. What was troubling Ziad? They did not know.

What we do know is that Ziad felt compelled to kill himself for Islam.

According to Islamic tradition and as instructed by "suicide teacher" Mohammed el Hattab, "He who gives his life for Islam will have his sins forgiven."

What sins had he committed? What had he done that was so utterly horrible that only a martyr's death could wash away his sins?

We do not know.

Yet, something so bothered the young man that he volunteered to participate in a mission of death that was guaranteed to end his painful life and cleanse him of his guilty sins.

MASS SUICIDE AND MODERN RELIGIOUS MURDERERS

Murder of the innocents and the slaughter of infidels and nonbelievers are not antiquated religious customs. Nor are these acts the exclusive province of Islam or men from the Middle East. Cults and religious groups regularly arise in various lands and cultures and frequently indulge in similar practices, e.g. the mass suicide of Jim Jones and his followers in "Jonestown" ("People's Temple"), David Koresh and the fiery death of his followers at Waco Texas.

MASS DEATH AT JONESTOWN

On November 18, 1978, the reverend Jim Jones exhorted and then forced his followers to engage in mass murder and mass suicide in Guyana. More than 900 people, many of them children, drank, or were forced to drink cyanide-laced fruit punch. Jones, a charismatic monomaniac who at one time was a favorite of San Francisco's liberal political elite, took a less painful and quicker way out. He died of a bullet to the head.

Jim Jones was born in 1931 and became a "Holy Roller" preacher as a child. As he reached adulthood he developed a creed he called "apostolic socialism" which deified social justice but which down played the role of god —hence his appeal to the ultra-liberal San Francisco political elite. Current San Francisco Mayor, and former leader of the California Assembly, Willie Brown, was one of Jones' "biggest cheerleaders." Nevertheless, despite his cult status even among the city's liberal elite, Jones became increasingly paranoid and disillusioned with San Francisco, especially following a negative magazine article in New West magazine. Jones moved his followers to a 3,800 acre plot of land in Guyana's outback, where they raised livestock and grew their own food.

The people's paradise soon became a prison camp. Followers were not allowed to leave, and there were forced beatings and forced sex. Jones who required that his followers refer to him as "father" demanded utter obedience.

Incessant screaming and threats were delivered nightly against imagined slights and for faintly perceived faults, with the guilty being beat with "the board of education." Anyone who questioned his authority was placed in "The Box," an underground coffin. Unruly children would be taken to the Jonestown well and hung upside down by a rope tied around their ankles and would be repeatedly dunked and beaten.

Jones became increasingly concerned about the CIA and FBI plotting against him and his paradise, and soon required that his followers practice mass suicide so as to protect them from outside threats: the "White Night" drills. Jones would get on the compound loud speaker at night and begin shouting: "White Night! White Night!" which signaled a coming attack. Followers were required to leap from their beds and assemble at designated spots where they would then drink from huge vats.

However, what triggered the mass suicide was a visit from a California politician, Leo Ryan, who upon leaving invited a number of Jones' followers to come with him. Ryan was murdered and insofar as Jones was concerned, the day of reckoning was at hand. One of those who drank the poison wrote in her suicide note: "We died because you would not leave us alone."

HEAVEN'S GATE

Mass suicide has been practiced by numerous religious cults, both ancient and recent, including, in the 1990s, 74 followers of the "Order of the Solar temple," and 39 members of "The Higher Source," i.e. "Heavens Gate." Many of the male members of the Higher Source, including the leader of the cult, a minister (and son of a Presbyterian minister), Marshall Applewhite (also known as "Do") also had themselves castrated.

In the case of Applewhite, castration was not only a means of achieving purity, but a way to control his rampant homosexuality. In 1970, for example, he was fired from the University of Saint Thomas after it became known that he was having sex with male students. Soon thereafter he apparently began hearing voices, including the voice of god and was awakened to a new form of spirituality which required abstinence from sex. His creed eventually came to include strict rules involving "no human-level relationships and no socializing."

As an aside it is noteworthy that abnormal amygdala activity, or amygdala destruction, can alter sex drive and sexual orientation, and can also induce a

loss of social interest. Human-level relationships are avoided (Joseph, 1999b; 2000a).

Soon Applewhite's credo came to include UFOs. Specifically, Applewhite saw the coming of the Hale-Bopp comet as a heavenly sign that a UFO was coming to take him and his followers to a better place, to "the level above human, to take us home to Their World: Heaven." The cultists, therefore, killed themselves by eating a poison laced pudding. They lay on bunk beds in a standard black uniform and Nike tennis shoes and died.

DAVID KORESH: BEATEN BY THY GOD

David Koresh ("Vernon") of the Branch Dividian cult, also ordered the death of his followers, and they apparently obeyed his wishes, for he had told them he was "god." In fact he first made his announcement on January 30, 1987, when he sent a wedding invitation to the Seventh Adventists Church in southern California, which read in part: "I have seven eyes and seven horns. My Name is the Word of God...Prepare to Meet Thy God."

David Koresh was a sexual sadist. He had sex with the wives of all his many followers, and had sex with and would beat and order the beating of their and his children. According to one of his followers, Marc Breault (Breault & King, 1993) "Children were spanked for any reason; crying during a sixteen hour Bible study, refusing to sit on Vernon's lap, or daring to defy the prophet's wishes."

"Each child had their own special paddle with their name written on it...Some women thought the best way to please their Son of God lover was to be especially severe when dishing out discipline. But sometimes it wasn't easy for the adults to spank the children. They couldn't find a spot on the child's buttocks that wasn't black and blue or bleeding" (Breault & King, 1993).

The women were sometimes subjected to the same treatment. One 29-year old woman who announced that she was hearing voices was imprisoned in one of the small cottages on their property. She was beaten, and repeatedly raped by her "guards."

David Koresh was also a prophet of Doom, and between the months of October 1991 to February 1993, he and his group spent over $200,000.00 on guns. This arsenal included 50-caliber machine-guns and a million rounds of ammunition (Breault & King, 1993). Koresh was not only preparing for

Armageddon but was contemplating mass suicide.

On Sunday, February 28, 1993, at 9.55 A.M., in Waco, Texas, a hundred ATF agents began their raid which resulted in a blood bath. A 51 day siege finally ended in a firestorm, and the death of David Koresh, his followers, and their children who burned to death when the compound was set on fire and burned to the ground. It was David's wish, however, for the entire world to go up in flames.

CROSS CULTURAL SPIRITUAL BLOOD LUST

These crazed religious practices are not limited to Americans. Consider, the Japanese religious cult "Aum." Their leader Shoko Asahara and many top cult members were arrested and charged with murder in June of 1995 for releasing the nerve gas Sarin in five subway cars during rush hour injuring over 5,500 Japanese commuters (New York Times, 6/7/95).

Similarly, although the "modern" Islamic, Christian and Jewish religions forbids it, many modern day Middle Eastern and African Islamic, Christian, and Jewish fundamentalists, regularly preach murder and hatred.

For example, "militant rabbis" in Israel had encouraged and condoned the assassination of Israel's Prime Minister, Yitzhak Rabin, and had issued a "pursuer's decree," which in effect morally required that he be killed (New York Times 11/11/95). And, he was murdered by a student of religion, Yigal Amir, who claimed he acted upon "God's" instructions.

Because of this limbic religious blood lust, members of religious sects may turn against one another and commit murder in the name of God, just as Jews murder Jews, and Christians murder Christians in the name of God.

For example, on November 29, 1998, six members of the United Pentecostal Church were arrested for kicking to death six people, including three children, "to wipe out the enemies of God." According to Reuters new agency (11/28/98), the killings began two weeks prior, when the pastor of the thirty member sect announced during a sermon that he could hear voices from Jesus Christ" ordering that members of the group be punished. "The pastor, helped by his wife and two other men, began beating, whipping and stamping on the worshipers... followed by more disciplinary torture over several days. Among the dead were two boys, aged three and four."

HINDU, MUSLIM, BUDDHIST SPIRITUAL BLOOD LUST

“Terrorist attacks” by Muslim religious zealots is not uncommon. However, these attacks and calls for the death of infidels, are not always aimed at Jews or Americans, but their “brothers” and “sisters,” i.e. fellow Arabs and Muslims.

Consider Algeria. Between 1992 and 1999, over 80,000 Algerians were murdered by Muslim zealots, with the majority of victims consisting of children, girls, and pregnant women who were beheaded, disemboweled, or who had their throats slashed. The reason for these murders and campaign of terror? To establish a holy Islamic state.

In fact, in 1998, on the first holy day of Ramadan—which marks “god’s” revelation of the Koran to the Prophet Muhammed—Muslim religious zealots killed and slaughtered more than 400 people, most of them women.

Hindu Muslim violence has haunted the country of India for hundreds of years, but reached a boiling point in 1947 when Pakistan, an Islamic nation, declared its independence from India, a secular democracy. Over a million Hindus and Muslims were slaughtered that year.

The violence and religious murders have continued unabated.

In the spring of 2002, a Muslim mob stoned and then set fire to a train carrying Hindus, burning alive dozens of women and children. The Hindus were returning from Ayodhya where they had been demanding the construction of a Hindu temple on the site of a mosque destroyed by their nationalists allies. After the train pulled into Godhra, a town populated mostly by Muslims, some of the Hindus began attacking Muslim men. The Muslim community reacted with stones and set fire to the train. Nearly 60 Hindus were killed.

The next day, tens of thousands of Hindus retaliated with acts of unspeakable butchery. Muslim men were beaten, stabbed, shot, and beheaded, young women and mothers were stripped naked, raped, and then skewered on swords or soaked with gasoline and set on fire. The bellies of pregnant women were slit open, and their unborn babies ripped from their bodies, raised skyward on the tip of a sword and then tossed into the many fires that were consumming Muslim towns and cities. Thousands of Muslims lost their lives in this manner and over 100,000 were left homeless.

Even Buddhist monks murder and assault one another. For example, in November of 1998, gray-robed Buddhist monks of the Chogye Buddhist order in Korea, spent several weeks assaulting and beating each other with

clubs, chairs, and even fire bombs as they battled over religious control of the order's main temple (Associated Press, 11/17/98). In one brawl alone, 37 were seriously injured and five killed.

RELIGIOUS MURDERS AND THE LIMBIC SYSTEM

What is the source of these religious-murderous and sadistic behaviors? The limbic system and the same cluster of nuclei which subserve aggression, sexuality, and spirituality. It is the limbic system which enables humans to respond with irrational and murderous blood lust in the name of "God" and religion and it is the amygdala that can induce a horribly violent and murderous assault with minor provocation—and as we have seen, the Lord God, and numerous religious fanatics, have also murdered at the slightest provocation.

For example, if the amygdala is directly stimulated rage reactions are commonly triggered. The face will begin to contort, the teeth will be bared, the pupils will dilate, the nostrils will flare, and then the animal or human will viciously attack (Egger & Flynn, 1963; Gunne & Lewander, 1966; Mark et al., 1972; Ursin & Kaada, 1960; Zbrozyna, 1963). Amygdaloid activation results in attacks directed at something real, or, in the absence of an actual stimulus, at something imaginary; including, presumably, in the case of religious fanatics, imaginary slights or insults.

There have been reported instances of patients suddenly lashing out and attacking friends, relatives or strangers while in the midst of a temporal lobe seizure (Saint-Hilaire et al., 1980), and/or attacking, kicking, and destroying furniture and other objects (Ashford et al., 1980). One female patient, during amygdala stimulation, became irritable and angry, and then enraged. Her lips retracted, there was extreme facial grimacing, threatening behavior, and then rage and attack—all of which persisted well beyond stimulus termination (Mark et al., 1972).

Yet another man developed intractable aggression following a head injury and the development of abnormal activity within the amygdala (Schiff et al.,1982). Subsequently, he became easily enraged, sexually preoccupied, and developed hyper-religiosity and pseudo-mystical ideas. He became violently religious.

Indeed, the amygdala is able to overwhelm the neocortex and the rest of the brain so that the person not only forms religious ideas but responds to

them, sometimes with vicious, horrifying results. Hence, it appears to be the limbic system, and the amygdala in particular, which not only contributes to religious and spiritual experience, but religious brutality and murder committed in the name of one's god.

Sexual Spirituality and the War Against Women

A not uncommon characteristic of high levels of limbic system and inferior temporal lobe activity are changes in sexuality as well as a deepening of religious fervor (Bear 1979; Blumer, 1970; Slater & Beard 1963; Trimble 1991; Taylor 1972, 1975). Hypersexuality or conversely, hyposexuality is not uncommon.

It is noteworthy that not just modern day evangelists, but many ancient religious leaders, including Abraham, Jacob (Israel) and Muhammed, tended to be highly sexual and partook of many partners (e.g. St. Augustine of Hippo: "Give me chastity, 'o lord, but just not yet"), or, they shared their wives (Abraham), or they married women who were harlots (e.g. Hosea) or had sex with other men's wives (Muhammed, King David), or killed other men in order to marry or have sex with their wives (King David).

King Solomon (like his father King David) experienced numerous dream states in which he communicated with God, and he required the sexual services of 700 wives and 300 concubines.

LIMBIC SYSTEM SEXUALITY

The limbic system is concerned with sex. Structures such as the amygdala and hypothalamus not only mediate sexual behavior, but they are sexually differentiated and have sex specific patterns of neuronal and dendritic development, (Allen et al. 1989; Blier et al. 1982; Gorski et al. 1978; Nishizuka & Arai, 1981; Rainbow et al. 1982; Raisman & Field, 1971, 1973; Simerly, 1990; Swaab & fliers, 1985). That is, there are "male" and "female" limbic systems, and even "homosexual" limbic systems such that male homosexuals are in possession of a limbic system which is more "female" than "male" in structural organization (Levay, 1991; Swaab, 1990), and in some respects (the anterior commissure) hyper-female in size (Allen, & Gorski, 1992).

Indeed it has now been well established that the amygdala and the

hypothalamus (specifically the anterior commissure, anterior-preoptic, ventromedial and suprachiasmatic nuclei) are sexually differentiated and have sex specific patterns of neuronal and dendritic development including the preoptic area and ventromedial nucleus of the hypothalamus (Bleier et al. 1982; Dorner, 1976; Gorski et al. 1978; Rainbow et al. 1982; Raisman & Field, 1971, 1973). The preoptic and other hypothalamic regions are not only sexually dimorphic but chemical and electrical stimulation of the preoptic and ventromedial hypothalamic nuclei triggers sexual behavior and even sexual posturing in females and males (Hart et al., 1985; Lisk, 1967, 1971). In female primates, even maternal behavior can be triggered (Numan, 1985). In fact, dendritic spine density of ventromedial hypothalamic neurons varies across the estrus cycle (Frankfurt et al., 1990) and thus presumably during periods of maximal sexual receptivity and arousal, as well as during pregnancy and while nursing.

Electrical stimulation of the preoptic area increases sexual behavior in females and males, including the frequency of erections, copulations and ejaculations, we well as pelvic thrusting followed (in the case of males) by an explosive discharge of semen even in the absence of a mate (Hart, et al., 1985; Maclean, 1973). Conversely, lesions to the preoptic and posterior hypothalamus eliminates male sexual behavior and results in gonadal atrophy.

Although the etiology of homosexuality remains in question, it has been shown that the ventro-medial and anterior nuclei of the hypothalamus of male homosexuals demonstrate the female pattern of development (Levay, 1991; Swaab, 1990). Male homosexuals are in possession of limbic system that is more “female” than “male” in functional as well as structural orientation.

The primate amygdala is also sexually differentiated (Nishizuka & Arai, 1981; see also Simerly, 1990). The male amygdala is 16% larger than the female amygdala (Breedlove & Cooke, 1999; Filipek, et al., 1994), whereas in male rats, the medial amygdala is 65% larger than the female amygdala and grows or shrinks in the presence of testosterone (Breedlove & Cooke, 1999).

The male vs female amygdala also contains a greater number of synaptic connections and shows different patterns of steroidal activity (Breedlove & Cooke, 1999; Nishizuka & Arai, 1981; Simerly, 1990). These sex differences are particularly evident in the medial amygdala, which is also a principle site

for steroidal uptake, including the female sex hormone, estrogen, and contains a high concentration of leutenizing hormones (Stopa et al., 1991). The number of immunoreactive cells in the female amygdala also fluctuates during the estrus cycle, being highest during proestrus (SImerly, 1990), and thus presumably acts so that if pregnant, the fetus will not be attacked as foreign, and/or so as to coordinate, with the hypothalamus, the appropriate neuroendocrine responses during pregnancy and following birth.

Because the amygdala is involved in sexuality and is sexually differentiated, activation of the amygdala can produce clitoral tumenence, penile erection, sexual posturing (Kling and Brothers, 1992; MacLean, 1990; Robinson and Mishkin, 1968; Stoffels et al., 1980) sexual feelings (Bancaud et al., 1970; Remillard et al., 1983). Electrical stimulation of the amygdala can also trigger sensations of extreme pleasure (Olds and Forbes, 1981), memories of sexual intercourse (Gloor, 1986), thrusting, sexual moaning, ejaculation, as well as ovulation, uterine contractions, lactogenetic responses, and orgasm (Backman and Rossel, 1984; Currier, Little, Suess and Andy, 1971; Freemon and Nevis,1969; Warneke, 1976; Remillard et al., 1983; Shealy and Peel, 1957).

Moreover, in rats and other animals, kindling induced in the amygdala can trigger estrus and produce prolonged female sexual behavior. In fact, abnormalor seizure activity within the amygdala or overlying temporal lobe may induce a female to engage in “sexual intercourse” even in the absence of a partner. For example, Currier and colleagues (1971, p. 260) describe a female temporal lobe seizure patient who was “sitting at the kitchen table with her daughter making out a shopping list” when she suffered a seizure. “She appeared dazed, slumped to the floor on her back, lifted her skirt, spread her knees and elevated her pelvis rhythmically. She made appropriate vocalizations for sexual intercourse such as: It feels so good...further, further.”

The anterior commissure, the band of axonal fibers which interconnects the right and left amygdala/temporal lobe is also sexually differentiated. Like the corpus callosum, the anterior commissure is responsible for information transfer as well as inhibition within the limbic system. Specifically, the female anterior commissure is 18% larger than in the male (Allen & Gorski 1992). Moreover, the anterior commissure is larger not only in females, but is 35% larger in homosexual males vs male heterosexuals (Allen & Gorski,

1992).

It has been argued that the increased capacity of the right and left female amygdala to communicate (via the anterior commissure) coupled with the more numerous and more densely packed neurons within the female amygdala (which in turn would decrease firing thresholds and enhance communication), and the sex diffferences in the hypothalamus, would also predispose females to be more emotionally and socially sensitive, perceptive, and expressive (Joseph 1993). Hence, these limbic sex differences induces her to be less aggressive and more compassionate and maternal, and affects her sexuality, feelings of dependency and nurturance, and desire to maintain and form attachments in a manner different than males. However, in homosexual males, this may predispose at least some of these males to not only behaving more emotionally, but more violently than women and even more violently than heterosexual men.

As will be detailed, it is these same sex differences in the limbic system which account for why women are more religious than men, attending church more often, and why homosexuals are drawn to the priesthood. Unfortunately, some of these homosexual priests, because they are in possession of a "female" limbic system that is bathed with aggression-inducing testosterone, have also promoted or engaged in religious violence directed toward men as well as women.

THE RELIGIOUS WAR AGAINST WOMEN

Abnormalities in the limbic system, the amygdala and hypothalamus in particular, can also provoke extreme sexual violence. In one case, a young man with seizure activity originating in his amygdala and temporal lobe, beat his mother to death and then sexually assaulted the body (Joseph, 2000a).

An abnormal limbic system may abnormally link sex with murder; and among men, the sexual murder or torture of women. Moreover, because the amygdala is clearly linked to religious experience, sexual behavior and religious expression may become linked in a positive or a negative fashion. For example, whereas a heterosexual male may respond to a beautiful woman with interest and sexual lust, homosexual priests may respond with murderous lust. Augustine, Jerome, Tertullian, and other Catholic theologians absolutely hated women, viewing them as evil temptresses that lead men to hell.

“What is the differences whether it is a wife or mother, it is still Eve the temptress that we must beware of in any woman.” -St. Augustine.

“Do you not know that you are each an Eve? The sentence of God on this sex of yours lives in this age: the guilt must of necessity live too. You are the devil’s gateway; you are the unsealer of that forbidden tree; you are the first deserter of the divine law; you are she who persuaded him whom the devil was not valiant enough to attack. You so carelessly destroyed man, God’s image. On account of you, even the Son of God had to die.” -Tertullian, 16th Century

Even the Lord God, Yahweh voiced contempt and hatred for women: “Because the daughters of Zion are haughty and walk with stretched forth necks and wanton eyes, walking and mincing as they go, and making a tinkling with their feet...The Lord shall wash away the filth of the daughters of Zion... by the spirit of burning.” -Isaiah 3:16-26, 4:4.

Women throughout the ages have been demeaned and attacked by male and homosexual religious authorities, and their murder was often sanctioned by various gods. Indeed, during the middle ages, the Catholic Church declared war on women who were then systematically tortured and slaughtered by the Catholic authorities.

FEAR OF FERTILITY

Yet another factor in the religious crusade against women was the fear of the goddess cult by the patriarchal religious authorities. For example, during the Crusades, because the women were temporarily freed of male dominance, some began to practice their own religion and worship their own goddesses, including those pagan goddesses that celebrated female sexuality; e.g., fertility cults— perhaps the oldest and most ancient of “organized religions.” In consequence, the leaders of the Catholic Church felt compelled to act. They sought to destroy woman in general, and those women associated in any way with the goddess and her fertility cults. Women, therefore, were suspect if they were in any way sexually attractive, and those who were the most sexually appealing (i.e. fertile) were the first to be murdered by the Catholic Authorities. Her reproductive facility was viewed as supernatural in origin, her menstrual cycle being in tune with the cycles of the moon, and the moon and the blood of her menstruation were believed to have supernatural power. Every woman was not just Eve, but an incarnation of the goddess.

The reproductive and supposedly supernatural power of menstrual blood may have contributed to those rituals requiring that animals be drained of blood and their blood splashed on religious altars, including the altars of the Lord God Yahweh. Originally it was menstrual blood that was splashed upon the altar of the goddess.

The ancient Hebrews, and the Catholic authorities, therefore, deemed a menstruating woman as unclean, for menstrual blood had the power of life and that of the supernatural. Women in general, therefore, were subject to attack, with the ancient Jews reciting a prayer thanking god "for not making me a woman." However, it was her reproductive facility, and thus her association with the goddess that was most feared and detested.

As detailed by Robert Briffault in his brilliant text, "The Mothers" (Briffault, 1931) "the supernatural source which magic powers are regarded as being primarily derived is... connected in the closest manner with the functions of women... her... reproductive functions... and a power which is used in a dread-inspiring manner. And by virtue of their natural position and function, the wielder of domestic magic...she had charge of the sacred objects and performed all the religious functions connected with the household."

Yet another factor in the religious persecution of woman, was her facility at speech. Indeed, and as is now well demonstrated, females demonstrate clear language superiorities over males, and they even talk faster as well (Joseph, 2000b). Speech and language, that is, a woman's tongue, is her natural and traditional weapon, which she may use for "pronouncing curses, of casting spells... of bewitching and performing incantations. It was a dreaded power. The curse of a woman is accounted far more potent than the curse of a man" (Briffault, 1931). Women in general, therefore, were considered suspect by the Catholic authorities and during the Middle Ages they were rounded up, sexually tortured, and killed.

THE CATHOLIC CHURCH DECLARES WAR AGAINST WOMEN

Woman has been persecuted by various religious authorities because of the power of her tongue, her reproductive power, her associations with pagan goddesses, and her ability to enchant men with her sexuality.

Woman is biologically predisposed to having multiple orgasms, multiple partners, and to indulging in promiscuity—which does not mean she will necessarily behave promiscuously (Joseph, 2000a,c). Nevertheless, because

of her sexual nature and association with fertility, religious rituals of the goddess stereotypically involved sexual orgies and ritual prostitution.

Although male authorities, both religious and otherwise, have attempted throughout the ages to control and yoke female sexuality, this has not always been successful. In Europe, including Rome, during the 6th through 11th century, female sexuality and her promiscuous nature was openly flaunted, and the worship of pagan goddesses became widespread and was threatening the authority of the Church. As early as the 1st century, the missionary sermons of St. Paul were repeatedly drowned out by women chanting "Diana, Diana, Diana;" Diana being the goddess known since prehistoric times as the Queen of Heaven.

Unable to suppress the goddess cult, and the fertility rites of her worshippers, the Catholic Church finally issued the "Canon Episcopi" in the 10th century: "Some wicked women, reverting to Satan, and seduced by the illusions and phantasms of demons, believe and profess that they ride at night with Diana, on beasts, with an innumerable multitude of women. It would be well if these women, one and all, perished for their infidelities."

HOLY WAR: WOMAN THE WITCH, SORCERESS, AND HEALER

The proclamation, however, had little effect. Hence, in 1252, Pope Innocent IV issued the Ad Exitrpanda, which authorized the execution of heretics (e.g. wealthy landowners) and the seizure of their goods, and the prolonged sexual torture of women who were beautiful, wealthy, or old, ugly, and eccentric and/or who gathered in groups to talk and converse and possibly worship pagan goddesses. This was followed by the first Papal bull on sorcery, in 1259, and yet another bull, the notorious Super illius specula, in 1322 (by Pope John the XXII), and then the famous Bull Summis desiderantes affectibus, in 1484 (by Pope Innocent VIII), which demanded the death of these women. The Popes and the Catholic Church proclaimed them witches and declared war against women.

Being "true soldiers of Christ," the Dominicans Heinrich Kramer and Johann Sprenger responded to this Papal decree by writing and issuing the Malleus Maleficarum (witch's hammer), thus unleashing a murderous, sadistic, blood lust that demanded the sexual torture and burning of "woman the witch, healer and sorceress" (Achterberg, 1991; Gies & Gies 1978; Lederer 1968). "For she is a liar by nature, so in her speech she stings while

she delights us... for her voice is like the song of the Sirens, who with their sweet melody entice the passerby's and kill them..." (Malleus Maleficarum).

These sadistic misogynists were soon seconded by Bishop Bossuet, of France, who believed there was an army of 180,000 witches threatening France and Rome, all of them beautiful and thus bewitching. The Bishop then demanded that they be gathered up in one body and that "all be burned at once in one fire."

And the great sin of these women? According to the Malleus Maleficarum "Carnal lust! All witchcraft comes from carnal lust, which in women is insatiable."

As summed up by Lederer (1968) in his interesting book, The Fear of Women, "witchcraft was a woman-thing, and the persecution of witches a man-thing; for it was first and last the women who were being persecuted and burned." In fact, hundreds of thousands of women were murdered, whole populations were destroyed, and some villages were left with only one female inhabitant. In 1404 alone, it is estimated that the Papal fathers burned at least 30,000 women. So many women were murdered, that it could be said that the Church was attempting no less than a whole sale genocide of women —"sexocide" at Lederer put it.

Because many of the men (the Crusaders) had been killed or were serving in the army of the Catholic Lord God, the women were often left unprotected. Sometimes whole villages were destroyed, or all the women in a given area were rounded up by the Catholic authorities and then sexually murdered.

These women, particularly those who were exceedingly attractive or ugly, were then hideously tortured and then slaughtered by burning, boiling in oil, crushing, and via whatever device the religious authorities felt appropriate or which suited their sick minds. In Germany huge ovens were constructed for the purposes of mass female murder (Achterberg, 1991; Lederer 1968). As noted, even the Lord God Yahweh recommended that haughty, beautiful women be burned in the fire.

However, it was not just beautiful females, for they come in a limited supply, but those who were old, eccentric, childless, and particularly women who owned property and pets, such as cats. Indeed, the cats would be tortured and murdered alongside the women. The "Black Plague" in fact was in part a consequence of the denunciation and killing of cats, coupled with the sanctification of rats and mice (the proverbial church mouse), by the Catholic

authorities.

As to the children of these witches, the Church had only “compassion.” These children would be merely flogged in front of the fires in which their mothers were burning.

Predominantly, when the priests set upon a village, it was the young and beautiful who were generally the first to be tortured, as they were experts at love magic. These beautiful women would bewitch men by shooting mesmerizing “beams of light from their eyes” which causes the man to fall in love (Briffault, 1931).

As pointed out by Dominicans Heinrich Kramer and Johann Sprenger, “Consider also her gait, posture, and habit, which is vanity of vanities. There is no man in the world who studies so hard to please the good God as even an ordinary woman studies by her vanities to please men... who... they infect with witchcraft by inclining men to inordinate passion. Yet...her heart is a net, it speaks of the inscrutable malice which reigns in their hearts... for they fulfill their lusts by consorting with devils.”

According to Pope Innocent VIII, these women “have given themselves up to devils in the form of incubi and succubi. By their incantations, spells, crimes, and infamous acts they destroy the fruit of the womb in women, in cattle and various other animals; they destroy crops, vines, orchards...they render husbands impotent.”

Of course, they also had the power to heal, so when the Archbishop of St. Andrews became ill and his physicians were unable to provide him with a cure, he sent for a well known woman healer whose expertise was in the making of ointments, Allison Peirsoun of Byrehill. Her cure was a success! So, the Archbishop had her tortured and burned.

RELIGIOUS SEXUAL SADISM

The torture of women, of course, was sexual. The woman would be stripped and her body, breasts, and orifices would be thoroughly investigated for the mark of the devil. However, the “investigation” was made with long needles and conducted by priestly specialists called “prickers,” who would stick these needles into every suspected Devil’s mark.

After the women became unconscious or unresponsive to the continued pricking, the priests would then employ “gresillons which crushed the tips of fingers and toes in the vice; the echelle, or rack, for stretching the body; the

tortillon for squeezing its tender parts... legs were broken, even into fragments... or the legs would be grilled on the caschielawis...the fingernails were pulled off with the turkas, or pincers, and needles driven up to their heads into the quick."

As summed up by Henry Charles Lea: "Protestants and Catholics rivaled each other in the madness of the hours... Christendom seemed to have grown delirious, and Satan might well have smiled at the tribute to his powers seen in the endless smoke of the holocaust which bore witness to his triumph over the Almighty."

SEXUALITY, THE GODDESS AND THE SERPENT

Karen Robidoux was a young mother and a member of a religious sect. Karen was also very attractive and beautiful, and some of the female members of the sect believed she was vain. They resented how some of the men of the sect would look at her. And then, one of the women, Michelle Mingo, experienced a vision and heard a voice: it was a prophecy from God. Because Karen was pretty, and vain, she could no longer eat solid food, but could only drink boiled almonds. Her 10month old son, Samuel, was also to be denied food. Breast milk would be his only source of nourishment. The sect members then allowed the boy to starve, and ignored his cries for food as they ate at the dinner table. He starved to death—"God's" punishment for his mother's beauty and sexuality.

Sexuality is a major concern of most major religions (Lederer 1968; Parrinder 1980; Smart 1969) as well as the limbic system. In fact, almost all major religions and their Gods, either act to promote sexuality, or to suppress it. This should not be entirely surprising for religions are very sexual and many were originally concerned with the fertility of the fields and the abundance of prey (Campbell 1988; Frazier 1950; Harris, 1993; Kuhn 1955; Malinowski 1948; Parrinder 1980; Prideux 1973). Religious rituals evolved accordingly beginning with the cult of the goddess, the sacred feminine, the Great Mother of All.

As summed up by Halle Austen (1990) in her book, The Heart of the Goddess, "creativity, the power to manifest physical and psychic reality, is one of the Goddess's primary aspects...the source of all being. She appears as the Great Mother, the Sustainer of Life, the Cosmic Creatrix. It is from her that all life proceeds and to her that all life returns." And, "just as our

ancestors honored a woman's ability to create humans from her womb and feed them from her breast, they also honored the Earth as the Great Mother who nourishes us" and the sky and heavens as the Great Mother who would nourish the Earth and her children with drops of life sustaining rain.

Aditi, the Hindu Goddess of the Void, for example, represented "creative power" and "abundance," and the cosmic womb from which all creation has its source. The goddess is also known as the celestial cow and the golden calf who provides nourishment not just to humans, but the gods. As the Great Mother also nourishes the gods, she is also the guardian of cosmic harmony and order.

The cult of the goddess has its origins in the Paleolithic. Hence the numerous "Venus" statues and carvings of heavy breasted pregnant women.

The goddess cult continued to reign supreme during the Neolithic and she was worshipped by the ancient Sumerians, Egyptians, Akkadians, Babylonians, Hebrews, and in fact all ancient peoples including those of the Americas and Australia.

The Australian Aborigines, for example, are not only the oldest continuous culture that has survived on this planet, but they have worshipped the Great Mother, the "All Mother" since time immemorial, depicting her as giving birth in dreamtime to all the peoples of the Earth.

Because the sun also nourishes the Earth, the Goddess was also a goddess of the sun, for the sun was originally thought to be female. Hence, Igaehindvo the Cherokee Sun Goddess, Brigit the Celtic Fire Goddess, and Amaterasu Omikami the Great Spirit Shining in Heaven and Goddess of the sun of ancient Japan: "The radiance of the Sun Goddess filled the universe and all the deities rejoiced." In ancient Egypt the goddess Nut was believed to have given birth to the sun.

Woman was also associated with the sun and fire because in many ancient cultures, it was believed that woman first discovered the art of making fire, which she used to warm the people and prepare the food. Fire is also a symbol of spiritual awakening and knowledge of the spirit world.

The goddess, therefore, was associated in all ways with all things having to do with life and death, and the spirit world.

"I am Nature, the universal Mother, mistress of all the elements, sovereign of all things spiritual, queen of the dead. Though I am worshipped in many aspects, known by countless names, and propitiated with all manner of

different rites, the whole earth venerates me." -Apuleius, second century B.C.

It is noteworthy that in addition to being the source of all life, that the Goddess was also associated with the serpent. The Sumerian "god" Enki, was depicted as a snake, and sometimes as a snake with breasts. The peoples of predynastic Egypt also worshipped the goddess in the form of a snake. In ancient Egypt, the hieroglyph for "snake" also means Goddess.

The Hindu Goddess Kali wore a garland of snakes around her neck—which represented the female life force, the transformative power of Shakti. Shakti was often depicted by the ancient Hindus and the pre-Aryan Dravidans, with a kundalini snake emerging from her womb and vagina.

The snake although an obvious phallic, and thus sexual symbol, is also associated with wisdom. Hence, the snake in the garden of Eden not only tempts Eve, but he induces her to eat of the fruit of the tree of knowledge. In fact, throughout the world snakes have commonly been the companions of oracles, those who had special knowledge of the future.

The snake represents supernatural knowledge and power which is one of the reasons the Lord God instructed Moses to "take your rod and cast it down before Pharaoh. It shall turn into a serpent... Then Pharaoh called the wisemen and the sorcerers, now the magicians of Egypt and they... cast down every man his rod, and they became serpents: But Aron's rod swallowed up their rods" (Exodus 7:10-12). And, it was a serpent which Moses carried as a fetish which he used to protect and lead the Israelites as they wondered for 40 years in the desert.

Nevertheless, because of its association with wisdom, sexuality, and woman, the serpent also came to be viewed as evil. The Lord God condemned the serpent, whereas the Catholic Church depicted this reptile as synonymous with Satan, the Devil. Both woman and the serpent became enemies of the Lord God.

SEX, FOOD, AND RELIGION

The limbic system mediates not only sexuality, but internal homeostasis and food intake. Likewise, many modern mystical and religious practices have also involved the ritual control over sex and food. This includes many American Indian, Christian, Jewish, and Moslem sects (Campbell 1988; Parrinder 1980; Smart 1969). Thus the commandment "thou shalt not... " These are limbic taboos, as eating and sexuality (like murder and violence)

are under limbic control.

Many limbic taboos, however, promote survival, for example, by proscribing the eating of poisonous plants or unclean animals. Similarly, by forbidding anal or indiscriminate sex one was spared the wrath of this "God" and whatever plagues he might send in the form of venereal disease or viruses. If we rule out the possibility of an attack with nuclear armed missiles, mass death due to disease is presumably what became of Sodom and Gomorrah where the anal sex crazed mobs attempted to sodomize even the angels sent by the "Lord God" himself (Genesis 19).

Sex and food (along with fear, rage, and aggression) are probably the most powerful of all limbic emotions and motivators. If sufficiently hungry or sexually aroused, these conditions can completely overwhelm the brain. Limbic hyperactivation in turn can induce religious or spiritual dreams or hallucinations.

Hungry men, women, and infants will dream of food. Those who are sexually aroused will dream of sex. However, a parched and starving man will not just dream, he will hallucinate food and water and will attempt to slake his desires by consuming a hallucination.

Given that early (as well as modern) human populations were often concerned with obtaining food (as well as a sex partner) many of their earliest religious beliefs and rituals were therefore concerned with increasing the abundance of game animals as well as preserving their own progeny (Armstrong 1994; Campbell 1988; Frazier 1950; Harris, 1993; Kuhn 1955; Parrinder 1980; Prideux 1973). As noted, many an ancient Upper Paleolithic cave was decorated with fertility and sex symbols, including pregnant women (Venus figures) and animals (Bandi 1961; Joseph 1996; Kuhn 1955; Leroi-Gurhan 1964), whereas Egyptian tombs contain numerous paintings of food and goddesses.

Thus, given our ancient hunter-gatherer (and then later, farming) heritage, many religions both ancient and relatively modern are highly concerned with fertility and food, and tend to be very sexual and limbic in orientation if not origin. This is also why there have always been fertility goddesses and gods who are associated with eating and drinking, especially alcohol (Campbell 1988; Frazier 1950; James 1958; Parrinder 1980; Smart 1969). This also includes, for example, Osiris, and especially Dyonisus who was among other things, a sex crazed dancing god of the vine. In fact, one of the first miracles

performed by Jesus involved making wine from water, and, as we know, Jesus surrounded himself with highly sexual women, prostitutes who would sometimes rub precious oil on his body.

SEX, GOD, AND RELIGION : RELIGIOUS LOVE CHARMS AND SPIRITUAL SEXUALITY

In Arabic-pre-Islamic tradition, it was said that martyrs were rewarded in heaven with 72 Virgins. “Man has not touched them before them nor jinni. Which then of the bounties of your Lord will you deny? Reclining on green cushions and beautiful carpets. Which then of the bounties of your Lord will you deny? —The Beneficent.

Hadith number 2,562 in the collection known as the Sunan al-Tirmidhi says, “The least [reward] for the people of Heaven is 80,000 servants and 72 wives, over which stands a dome of pearls, aquamarine and ruby.”

Among the ancient religions of India and China, the sexual activity of the Gods and the promotion of similar sexual activities among the believers were widespread religious practices and beliefs (Austin 1990; Campbell 1988; Parrinder 1980).

For example, the ancient Vedas were greatly concerned not only with the worship of various nature gods, but with the rituals of sexual union. Ancient Indian religious texts are filled with love charms and instructions as to how to win the love of a man or woman, or to protect against demons.

Temple prostitutes were also quite common throughout India and the Middle East, as well as in Rome and Greece. Some temples employed so many girls that they were like giant brothel emporiums (Parrinder 1980). As noted, sexuality and desire (like religious feeling) are directly mediated by the amygdala and hypothalamus.

In fact, sexual intercourse became a religious ritual among Hindus and Buddhists who practiced “tantra.” The practitioners of tantra were inspired by visions of cosmic sex and the acquisition of sexual energy. Through tantra one might be confronted with the cosmic mystery of creation as exemplified by another deity, Shakti, the divine mother. However, restrictions on where one could have sexual intercourse (not in public) and certain types of sexual acts such as oral sex, were prohibited as well as sex with strange women or those of a lower caste (Parrinder 1980). Nevertheless the joys of sex were continually emphasized and embraced. Hence, the Kama Sutra, the “love

text".

On the other hand, it was believed by some ancient far Eastern sects that in order to gain power, one had to break taboos and, for example, engage in sexual orgies or have sex with women while they were menstruating. Menstrual blood was believed to possess the spiritual and creative life force, whereas sexual orgies were believed to liberate tremendous amounts of sexual energy.

These "taboo" sexual practices were also a form of tantra, referred to as "left handed tantra." Those who followed the way of the left handed trantra claimed that passion was nirvana and that adepts should cultivate all sexual pleasures (Parrinder 1980). Both male and female deities, usually in the act of having sex, were worshipped.

Ancient Chinese and Taoists religions are also quite sexual (Austin 1990; Parrinder 1980).

These beliefs are exemplified by the concepts of Yin and Yang which appeared over 3000 years ago and which represented the male and female principles of the universe. Sexual intercourse was viewed as a symbolic union of the earth and heaven, which, during rainstorms were believed to mate. By engaging in sexual relations man and woman achieved harmony by following the example of the gods.

THE LORD GOD: A SEXUAL GOD

Beginning at about the same time that the Judaic religion became more dominant in certain areas of the Middle East, around 3,000 years ago, and over the following thousand years a tremendous change in religious sexual thought began to flourish, enveloping the Roman Empire, and which eventually paralleled and coincided with the development of Christianity and Islam.

Unlike the goddess and the highly sexual gods of, for example, the ancient Greeks and Romans, the "Lord God" of the Old Testament does not have sex with human women and there is no hint of sexual duality in his personage. He is a male god, a warrior and destroyer. Although not overtly sexual, the sexual activities of men and especially women were of great concern to Him. Be fruitful and multiply, He ordered, and as to certain women who were presumably barren, and in one case, still a virgin, He is reported to have opened their wombs.

Male sexuality was also a concern; that is, the diminishment of the intensity of man's sexual pleasure. Thus He required a form of sexual self-mutilation. As part of his covenant with Abraham and the Israeli people, it was ordered that every male child would suffer the amputation of the tip of his penis (which is densely innervated by fibers that yield intense sexual pleasure): "And ye shall circumcise the flesh of your foreskin; and it shall be a token of the covenant betwixt me and you" (Genesis 17: 10-11).

Although there is no evidence that the Lord God was sexually active with human females, it does appear that the Lord God had a sexual consort, the goddess Sophia, before he became the Lord God of the Earth. Sophia was the goddess of wisdom and she was not only his lover, she may have been his sister: "It is Wisdom calling. Understanding raising her voice. I Wisdom, live with Prudence; I attain knowledge and foresight... The Lord possessed me in the beginning in his own way, before his works of old...When he prepared the heavens, I was there...I was by him as one brought up with him. I was daily his delight, rejoicing always before him" (Proverbs 8).

In addition, it appears that she may have betrayed Him. "Rejoicing in the habitable part of the earth, and my delights were with the sons of men" (Proverbs 8:31).

It is true, however, that the above quote may mean that she simply was delighted by the sons of men, and did not have sex per se with men.

However, if she did betray Him, this may explain why she is never again referred to, as well as His following complaints: "Aholah played the harlot when she was mine; and she doted on her lovers...desirable young men...thus she committed her whoredoms with them and with all whom she doted... she defiled herself" (Ezekiel 21: 5-7). "Like mother, like daughter. You are the daughter of your mother, who rejected her husband" (Ezekiel 16: 44-45).

It may also explain His jealous prying nature, and obvious dislike of the female sex and his recommendation that women who were truly attractive and sexually desirable should be burnt (Isaiah 3:16-26, 4:4) as they were all "whores" (Hosea 2).

"Because the daughters of Zion walk with wanton eyes, mincing as they go, and making a tinkling with their feet...The Lord shall wash away the filth of the daughters of Zion... by the spirit of burning" -Isaiah 3:16-26, 4:4.

Indeed, Sophia's "delights with the sons of men" and her betrayal of the Lord God may explain why He not only disdains pretty women, but pardons

and encourages the sexual exploitation of women and the rape and sexual slavery of women, and their murder if they dare behave like whores. In fact, He brags that he "delivered...Aholah who played the harlot when she was mine...into the hand of the Assyrians... They discovered her nakedness; they took her sons and her daughters, and slew her with the sword... they executed judgment on her" (Ezekiel 23:9-10).

RELIGIOUS RAPE AND SEX SLAVERY

The Lord God is very concerned with the sexual relations between men and women. Those men He loved most dearly had sex with multiple sex partners. The Lord God even approved of sex slavery, including sex with little girls who are taken slave:

"Kill every male among the little ones. But all the women and female children that have not known a man, keep alive for yourselves." -Numbers, 31

The permissive attitude of the Lord God when it comes to female sex slavery may explain why the modern state of Israel not only has no laws forbidding the owning or selling of human beings, but why non-Jewish women are openly sold as sex slaves in the state of Israel (see M. Specter, "Traffickers New Cargo: Naive Slavic Women, New York Times, January 11, 1998).

And, once a sex slave, always a sex slave, even if she is Jewish female.

"When you acquire a Hebrew slave... and if his master gave him a wife, and she has borne him children, the wife and her children shall belong to the master. When a man sells his daughter as a slave, she shall never be freed, as male slaves are." -Exodus, 21: 2-7.

And the Lord God even encourages and pardons the violent rape of young Jewish virgins by Jewish men. For example, after some of the Benjaminites raped a woman to death (Judges 19:25), and following the murder of their own women in retaliation by the other 11 tribes of Israel, these tribes then realized that the tribe of Benjamin would die out without women. So, they decided to attack yet another city of their fellow Jews and to "utterly destroy every male and every women that hath lain by man" with the exception of "young virgins" who the Benjaminites were allowed to rape (Judges 21:11-13).

However, not enough virgins were acquired following this massacre. So

the Benjaminites were instructed by the Lord God to rape another group of young Jewish virgins.

"Then they said, Behold there is a feast of the Lord in Shiloh...Go and lie in wait in the vineyards. And see and behold if the daughters of Shiloh come out to dance in dances, then come ye out and catch you every man his wife of the daughters of Shiloh" (Judges 21:19-25).

The Benjaminites, however, raped men as well as women, and were quite willing to gang rape a woman until she was dead (Judges 19:25-26, 20:5). According to the divine law, they could also brutally and sadistically rape female slaves; and if she lived for two days following a violent, brutal rape, there was no penalty.

Again, the Lord God of the ancient Jews had an obvious contempt for the female sex: "Because the daughters of Zion are haughty and walk with stretched forth necks and wanton eyes, walking and mincing as they go, and making a tinkling with their feet; The Lord will smite with a scab of crowns of their head and the Lord will discover their secret parts. In that day the Lord will take away their tinkling ornaments...their bracelets...bonnets, ornaments...earrings, the rings...and fine linen...And it shall come to pass that instead of sweet smell there shall be stink." -Isaiah 3:16-26, 4:4.

Indeed, this Lord God, when angry, found pleasure in using explicit sexual imagery when condemning his people, Israel—whom He referred to as a woman when He was angry. Indeed, He repeatedly threatened to strip this brazen female "naked" and referred to her as an "adulterous harlot." Echoes of the divine betrayal by the Sophia, the goddess of Wisdom?

"And let her put away her harlotry from her face and her adultery from between her breasts. Else I will strip her naked... And I will snatch away My wool and My linen that serve to cover her nakedness. Now will I uncover her shame in the very sight of her lovers..." -Hosea 2.

SEXUALITY, PEDOPHILIA, & HOMOSEXUALITY

Although this volatile, mercurial, and masculine seeming "Lord God" was asexual, sexual behavior was of tremendous concern to "Him" for He commands sexual moral obedience—at least of women and married women in particular— and repeatedly tells his people, starting with Adam and Eve, "be fruitful and multiply."

And sexuality, and the condemnation and/or control of sexuality, has been

and remains a major concern of cults or established religions. The temple virgins who served the virgin goddesses of ancient Greece and Rome, were required to remain celibate upon threat of death. Shakers' communities have been dying out for lack of sex and children. Buddhist monks are celibate, and Hindu "renouncers" swear off sex later in life. According to Catholic Canon law priests are required to remain celibate and celibacy is defined to include "perfect and perpetual continence," meaning no sexual activity of any kind, including masturbation.

However, celibacy did not become a requirement of priests until 1139 when it became church law. Prior to 1139, priests, bishops, cardinals, and even Popes had lovers and wives, some Popes had several.

The Mormon Church initially willingly embraced, as a religious creed, the right of every man to have several wives; i.e. sex partners, and the founder of the Church was reputed to have 40 wives. Likewise, Muhammed was reported to have the sexual prowess of forty men, and to have bedded at least 9 wives and numerous concubines including even one young girl (Lings 1983). However, the grand champion of religious-sexual excess was King Solomon who required the sexual services of 700 wives and 300 concubines.

Sex scandals are also commonplace among priests, rabbis, pastors, and ministers.

The Reverend Jimmy Swaggart whose sermons were filled with fire and brimstone, and who regularly assailed Catholics, Jews (who "are going to Hell") pornography and prostitution, temporarily gave up a $150 million dollar a year world wide television ministry in 1988, when his fondness for prostitutes and pornography was exposed and he was caught with a prostitute. Moreover, the attorney who exposed Swaggart also claimed the minister was a pedophile. Swaggart has since returned to the ministry. During his sermons he yells, collapses to the floor, recounts conversations with god, repeatedly breaks into tears, and again rails against Catholics and Jews (who "are going to Hell"), and against pornography, prostitution, as well as hypocrisy.

Likewise, Jim Bakker lost a 300 million dollar ministry, when among other things, he and another pastor were accused of repeatedly sexually assaulting a young female member of their flock. In 1999, the dean of Harvard Divinity School was forced to resign "for conduct unbecoming" after it was discovered that he had downloaded thousands of "explicit" pornographic images on his Harvard-owned computer in his Harvard-owned

home.

In January of 2001, the Reverend Jesse Jackson admitted that he had cheated on his wife and has fathered a daughter from another woman. “No doubt, many close friends and supporters will be disappointed in me,” Jackson said.

Sex with little girls is permitted by the Jewish Holy book, the Talmud:

For example, according to the Talmud: “Rab said: When a grown-up man has intercourse with a little girl it is nothing, for when the girl is less than this it is as if one puts the finger into the eye... tears come to the eye again and again, so does virginity come back to the little girl under the age of three.”

Talmud Sanhedrin 55b “Come and hear! A maiden aged three years and a day may be acquired in marriage by coition [sexual intercourse], and if her deceased husband’s brother cohabits with her, she becomes his.”

The Talmud, is believed by Orthodox Jews, to be based on god’s laws and to be Mosaic in origin; that is, based on oral (and written laws) first put forth my Moses: “Kill every male among the little ones. But all the women and female children that have not known a man, keep alive for yourselves.” - Numbers, 31

Sex with children, and especially sex with little boys, has been a common religious practice, and a priestly predisposition, since the inception of the priesthood and organized religion.

DAVID KORESH: SEXUAL THEOLOGY

David Koresh announced he was God in a wedding invitation to the Seventh Adventists Church in southern California. It read in part: “I will scold your daughters for their nakedness and pride that they parade in My Father’s house, and by my angels, I will strip them naked before all eyes because of their foolish pride.” Naked women at his mercy and who he would impregnate and “fill with seed” was his predominant religious fantasy.

As he confided to his “right hand man” Marc Breault early in his ministry: “I’ll have women begging me to make love to ‘em. Just imagine, virgins without number.” Within just a couple of years he would be attended by at least twenty young women, most of whom he “married,” including two that were just 14 years old, and one who was age 12 (Breault & King, 1993).

Sex was at the center of his theology, even claiming that god would take them to heaven in a divine spaceship that he sketched on a blackboard. It was

an erect penis!

Koresh apparently was consumed by sexual thoughts and was the recipient of sexual visions that he claimed were sent to him by God. Soon he began demanding sex from the wives of his followers, women who he believed had married these other men without his permission and who should have married him: “All you men are just fuckers, that’s all you are. You married without getting God’s permission.

Even worse, you married my wives. God gave them to me first. So now I’m taking them back.” According to Marc Breault, everybody was shocked, stunned, and Vernon kept saying things like: “So Scott, how does it feel to know your not married anymore... In October, 1989, he began having sex with the other men’s wives... and directed the women to inform him when they had reached the fertile part of their cycle to maximize the chance of pregnancy.” As per the men, Vernon

informed them that it was their job to “defend King Solomon’s bed.”

Vernon not only had sex with and impregnated their wives—fathering over 20 children— but began having sex with these children; that is, when he wasn’t beating them.

PEDOPHILE PRIESTS

As the American public learned in the Spring of 2002, pedophile priests have been raping little boys for decades if not for the last thousand years. Indeed, homosexuality and the homosexual rape of boys and young men is so common in the Catholic church that by edict, priests are no longer allowed to be alone with altar boys.

In 1999, the Bishop of the Santa Rosa Diocese in California was forced to resign because another priest accused the Bishop of repeatedly raping him.

Rev. John Rebovich enticed teenagers with free alcohol and then would rape them when they were too drunk to resist.

Gerald Ridsdale, an Australian Catholic priest, pleaded guilty to sexually assaulting 21 children.

Stephen Kiesle, a priest serving in Fremont, California, was charged in May of 2002 with sexually molesting up to 21 children. Kiesle had admitted to police that he “really liked young blond girls.’’ However, his victims included both boys and girls, many as young as 9, some of whom he would tie up before assaulting them sexually.

The Rev. Paul Shanley has been accused of raping hundreds of boys. Indeed, Paul Shanley openly advocated the idea of sex between men and boys and he often attended meetings with the North American Man-Boy Love Association.

Boston priest John Geoghan had been raping young boys for over three decades; nearly 200 boys in 30 years. He is not alone.

It has been reported by the Boston Globe that 50 of Boston's Roman Catholic priests have been molesting boys for decades. Because of the public uproar, the Boston archdiocese was forced to remove over 20 priests between January and September of 2002, because of sexual misconduct and the rape of young boys. Over 400 lawsuits have been filed against priests in Boston.

In 2002, a number of seminary students were expelled from the Catholic Theological Union in Chicago because they were openly engaging in homosexual relations with one another. The Maryknoll Seminary is known to be "overrun with gay men."

The entire Catholic Church appears to be overrun with "gay men;" that is homosexual pedophiles. In consequence, when one pedophile priest is removed or transfers, another pedophile takes his place.

In March of 2002, Anthony J. O'Connell, the Roman Catholic bishop of Palm Beach, Florida, resigned after admitting that he sexually abused a teenage seminary student. He had also been accused of raping two other boys. He had been appointed to lead the Church by Pope John Paul II following the resignation of another pedophile, Bishop Joseph Keith Symons, who admitted sexually assaulting at least five boys.

According to Dr. Thomas Plante of the Jesuit college, Santa Clara University, and editor of a book on sexuality and the church, "50% of the Catholic clergy are gay." The Boston Globe (1/31/ 2000) has revaled that Catholic priests have a rate of HIV infection which is four times that of the general population.

Estimates as to the number of active, homosexual pedophiles in the Catholic Church range from 6.1% to 16% according to Richard Sipe, an "expert" on sex abuse and the Church.

There are an estimated 50,000 priests in the US. Hence, the number of pedophile priests could range from 3,000 (6%) to 8,000 (16%). However, there are only 188 diocese in the U.S., which means that there are anywhere from 16 to 42 pedophile priests per diocese.

Not surprisingly, over 800 priests have been removed from the ministry as a result of allegations against them. There have so far been over 1,400 insurance claims against the Church. The Church has so far paid out over $1 billion in liability with an estimated $500 million pending.

Not surprisingly, pedophile priests often work together in the same church or diocese. The Rev. Paul Shanley and another pedophile priest owned and operated a "gay inn" in Palm Springs which catered to gay men. Shanley is accused of raping hundreds of boys. Indeed, Paul Shanley openly advocated the idea of sex between men and boys and he often attended meetings with the North American Man-Boy Love Association.

Likewise, according to the Cleveland Plain Dealer in a series of stories printed in the Spring of 2002, "parishes such as Ascension and St. Patrick, both in the West Park neighborhood of Cleveland, had more than one alleged abuser working at the same time." Moreover, when they work together, they also aid each other in recruiting and raping children.

Consider, for example, Reverends Gary Berthiaume and Allen Bruening. As detailed in May of 2002, by the Cleveland Plain Dealer: "Bruening would use trips to the pool to seduce young boys." One child, "Frank (not his real name), says he not only had to contend with Bruening, but also with Berthiaume, who was sent to the Cleveland diocese after serving six months in a Michigan prison for child abuse. After the swimming trips, says Frank, both priests were waiting in the showers. While Bruening stood naked in a one-person stall, says Frank, Berthiaume would be ordering him to join the other priest in the shower."

"Here I am, a little kid, and here is this pastor, you want to believe you're a good kid," Frank says. "This person is the next closest thing to God. You would do anything that they would say. How could you question these people?"

According to Professor Germain Grisez, and as he reported to the Bishops Committee on Sexual Abuse, the Catholic Church is permeated by a "homosexual subculture" and "homosexual clerics" who seduce "adolescent boys."

Likewise, according to Father Donald B. Cozzens, author of The Changing Face of the Priesthood, there are a "disproportionate number of gay men that populate our seminaries."

As summed up by Bishop Wilton D. Gregory, "It is an ongoing struggle to

make sure the Catholic priesthood is not dominated by homosexual men."

It is in part because of the homosexual culture and the large number of pedophile priests that the Catholic Church and its Catholic Bishops have for centuries, covered up the homosexual rape of children by not just priests, but Bishops and Cardinals.

For example, Boston priest John Geoghan had been raping young boys for over three decades. When Bernard Cardinal Law of the archdiocese of Boston became aware of Geoghan's behavior which was threatening to become public, he quietly transferred Geoghan to another parish where he immediately began sexually assaulting children. Geoghan was not the only priest he transferred; and many other bishops have done likewise: cover up the crime and transfering the pedophile priest to another city where he can continue raping boys.

It is also because of these coverups, that in March of 2002, several Federal anti-racketeering suits—RICO The Racketeering Influenced and Corrupt Organizations Act— have been filed. By filing that kind of suit, the lawyers are calling the Catholic Church a criminal enterprise.

It is because of this overarching homosexual-pedophile culture that many priests, bishops, and cardinals, have not just covered up abuse, but in fact see nothing wrong with it, viewing these crimes as "forgivable"—except in those cases where a priest or Bishop repeatedly rapes young boys and the rapes become public.

Even in these latter instances, Church officials, until recently, were inclined to reinstate pedophile priests even after their cases become public or the cause of ruinous lawsuits.

For example, Bishop Donald W. Wuerl of Pittsburgh, had to battle with Church officials for over 7 years before he was able to remove Rev. Anthony Cipolla. Cipolla had been accused of raping altar boys, one of whom filed suit.

Father Cipolla appealed to the Vatican's homosexual hierarchy, its highest tribunal, which ruled to reinstate him despite the suitcases full of papers which documented the priest's sex crimes. Essentially, the Vatican, in making this ruling, also ruled that it was permissible to have sex with children.

Most Bishops are more concerned with protecting the church's name and its bank accounts, and with making it possible for pedophile priests to

continue raping boys. Until recently, American bishops have repeatedly transferred predator priests from parish to parish, but only when their sex crimes threatened to bring unwanted publicity to the parish.

In May and June of 2002, when the scandal grew and threatened to completely overwhelm the Catholic Church, Church officials and thus the homosexual hierarchy first tried to downplay the problem and then sought to distinguish between sex with young children who were unwilling to have sex, and sex with older children and older boys who, the Church claims, welcomed if not solicited the sex. The Church denied that it had a problem, and claimed that rapes and sex with minors was not truly an act of pedophilia, because "almost all the cases involved adolescents and therefore were not cases of true pedophilia."

Moreover, according to Church officials, these offenses are forgivable because they amount to little more than the sexual seductions of teenage boys who willingly submit.

In May, and as was widely reported in newsapers such as the Boston Globe, Church officials announced that priests who had abused children in the past, would remain priests so long as there was no evidence that the priest in question was a serial abuser. Likewise, those who abused children in the future would not suffer any penalty, that is, unless they raped and sexually assaulted a number of children. However, even in these cases bishops would be given the discretion to retain these priests given mitigating circumstances.

"The question of the reassignment of priests who have harmed children is still a thorny issue," said Bishop Wilton D. Gregory, president of the United States Catholic Conference, the national forum for American bishops.

To their surprise, the public and the media reacted angrily to their pronouncements and the willingness of the Church to tolerate the sexual rape of young boys. It was repeatedly said in the media, that "the Catholic Church just doesn't get it."

Presumably, the homosexual hierarchy was unable to understand why the public was outraged, precisely because this homosexual hierarchy experienced the same "forgivable" sexual longings for children. In fact, three of the five members of the Ad Hoc Committee on Sex Abuse, including its chairman, Bishop John B. McCormack of Manchester, N.H., had been severely criticized for their handling of sex abuse cases, and their willingness to tolerate the rape of children and homosexuality among members of the

clergy. Because so many shared the same deviant desires, even minor sanctions against abusers thus seemed excessive to many in the pedophilia priesthood.

In fact, on August 8, 2002, the Rev. Connors, the president of an association of Roman Catholic religious orders, publically complained that pedophile priests were being "scapegoated" and then criticised American bishops for reacting to the complaints of victims and the media, charging "that American bishops have been scapegoating abusers." Connors also ridiculed those victims who had stepped forward by asking: "Are we having fun yet?" Connors, as president, represents the views of 15,000 U.S. priests in orders such as the Jesuits and Benedictines.

We should recall, that these are the same religious orders which burned women and beat their children in front of the raging fires. This is the same church which would castrate young boys to keep them singing and looking pretty; i.e. the "castratos"--boys who were also the sexual playthings of Bishops, Cardinals and priests.

Thus we should not be surprised to discover that insofar as modern pedophile priests, and the majority of bishops and cardinals are concerned, sex with boys is normal and forgivable. In fact, even sex with children could be forgiven so long as a large number of children were not involved and the cases did not become public.

Specifically, in June of 2002, top Vatican officials and American cardinals tried to contain the public uproar. Repeat offenders and those priests who "become notorious and are guilty of the serial, predatory sexual abuse of minors," would be dismissed, said Cardinal Theodore E. McCarrick of Washington. However, as to those priests who had molested and sexually assaulted children in the past, the Church would be more lenient and leave it up to the local Bishops to determine if the priest was a true danger to children.

According to Cardinal Francis E. George of Chicago, the church wanted to protect the rights of priests who had been accused. In fact, Church officials sent a letter to Catholic priests in America, expressing sympathy and support "through these troubled times. We regret that episcopal oversight has not been able to preserve the church from this scandal," the letter read. That is, the sympathy of the church, was not for the victims, but only for the church and its priesthood. Indeed, pedophile priests must be protected according to

Bishop Gregory, who emphasized that “even a priest who offends still enjoys rights.”

Cardinal Francis George, of Chicago has also argued that bishops should be allowed to make distinctions between serial pedophiles and priests who “crossed boundaries” with older teenagers.

“A little more wiggle room enables you to be more just,” Cardinal George said. “There is a difference between a moral monster who preys upon little children, and does so in a serial fashion, and someone who perhaps under the influence of alcohol engages in an action with a 17or 16-year-old young woman who returns his affection.” Young woman?

Stephen Rubino, a lawyer who has represented over 300 alleged victims of priest abuse, estimates 85% of the victims have been teenage boys.

As summed up by National Review senior writer Rod Dreher “This is chiefly a scandal about unchaste or criminal homosexuals in the Catholic priesthood.”

Even some Catholic priests and Bishops grudgingly agree, though they were again quick to make a distinction between pedophilia and sex with young men: According to Monsignor Eugene Clark of New York, “disordered” homosexuals were to blame. His view was seconded by the Bishop of Detroit who has said the current crisis is “not truly a pedophilia-type problem, but a homosexualtype problem.”

Indeed, homosexuality is so rampant among Catholic priests that according to the Boston Globe (1/31/2000) they have a rate of HIV infection which is four times that of the general population.

And its is not just the Catholic Church which is a refuge for homosexual priests. The Presbyterian Church stated that perhaps as many as 23% of clergy have had “inappropriate sexual contact” with other men. As detailed in the San Francisco Chronicle (Lattin, 7/15/97) homosexuality became so rampant within the ministry of the Episcopal church, and its homosexual clergy so openly promiscuous that the church lost over 5 million members by 1997.

In Australia, hundreds of boys and young men have alleged they were raped by the homosexual priests and pastors of the Christian Fathers boarding schools.

In Islamic countries, homosexual are also drawn to the priesthood. It is rumored, for example, that in the holy city of Om, in Iran, that homosexuality

and homosexual pedophilia is a common, albeit forbidden practice among Mullahs who sexually exploit their young male charges.

Homosexuality and homosexual pedophilia are common among the Hindu priesthood and the Hare Krishnas. In fact, over a dozen Hare Krishna temples in the United States were forced to file for bankruptcy in 2002, because of the over 400 million dollars in judgments awarded in lawsuits for the homosexual sexual abuse of boys and young men. They are not alone: The archdiocese of Boston has acknowledged playing millions of dollars in settlements for almost 90 priests.

THE LIMBIC SYSTEM AND SEXUALITY

Why the concern regarding sex pro or con in religious thought? Why the illicit, perverse, or promiscuous tendencies of priests and other religious leaders? Sex, like religious experience, or the ability to derive pleasure from eating and drinking, is mediated by the limbic system; i.e. the hypothalamus, amygdala, and temporal and frontal lobes (e.g. Freemon & Nevis 1969; Joseph, 1988a, 1992a, 1999a; MacLean 1969, 1990; Remmillard 1983; Robinson & Mishkin 1968).

Activation of the sexually dimorphic amygdala can produce penile erection and clitoral engorgement (Kling & Brothers, 1992; MacLean, 1990; Robinson & Mishkin, 1968; Stoffels et al., 1980), and trigger sexual feelings (Bancaud et al., 1970; Remillard et al., 1983), extreme pleasure (Olds and Forbes, 1981), memories of sexual intercourse (Gloor, 1986), as well as ovulation, uterine contractions, lactogenetic responses, and orgasm (Backman & Rossel, 1984; Currier et al., 1971; Freemon & Nevis, 1969; Remmillard et al., 1983). However, the limbic system also mediates violent behavior, including sexually violent behavior. Thus religiosity also can also be tainted by violent sexual thoughts and behavior.

THE GODDESS, HOMOSEXUALITY, & RELIGIOUS EXPERIENCE

It has been estimated that at least 50% of Catholic priests are homosexuals, and that the HIV rate among Catholic Priests is four times that of the general population. In fact, throughout history, shaman and other religious figures have commonly been homosexuals. Homosexuals are probably drawn to the priesthood for the same reason that women have been viewed as more in touch with the supernatural; i.e., the sexual differentiation

of the limbic system.

Recall that portions of the hypothalamus and amygdala are sexually dimorphic; i.e. there are male and female amygdaloid nuclei (Bubenik & Brown, 1973; Nishizuka & Arai, 1981). Female amygdala neurons are smaller and more numerous, and densely packed than those of the male (Bubenik & Brown, 1973; Nishizuka & Arai, 1981), and smaller, densely packed neurons fire more easily and frequently than larger ones. This may contribute to the fact that females are more religious, more emotional and more easily frightened than males as the amygdala is a principle structure involved in evoking feelings of fear (Davis et al., 1997; Gloor, 1997; LeDoux, 1996) as well as spirituality.

THE FEMALE LIMBIC SYSTEM AND RELIGIOUS EXPERIENCE

Confirming common experience, numerous scientific studies have demonstrated that women display clear superiorities over males in regard to the expression, perception, and comprehension of social emotional nuances, regardless of the manner in which they are conveyed (Burton & Levy, 1989; Brody, 1985; Buck, 1977, 1984; Buck et al., 1974, 1982; Card et al., 1986; Eisenberg et al., 1989; Fuchs & Thelan, 1988; Harackiewicz, 1982; Lewis, 1983, Rubin, 1983; Safer, 1981; Shennum & Bugental, 1982; Strayer, 1980). And this is true even from the earliest stages of childhood.

This greater social emotional sensitivity, including a much greater likelihood of becomes frightened and easily terrified, is likely due to sex differences in the functional and structural organization of the limbic system, the amygdala in particular. Because female amygdala neurons are more numerous and packed more closely together (Bubenik & Brown, 1973; Nishizuka & Arai, 1981), and as smaller, tightly packed neurons demonstrate enhanced electrical excitability, lower response thresholds, and increase susceptibility to kindling, there is thus a tendency for the female amygdala to become hyperactivated more easily than the male amygdala—thus inducing extreme fear as well as a propensity for religious and spiritual feelings.

Indeed, women are not just more emotional, but have more intense religious experiences, attend church more often, are more involved in religious activities, involve their children more in religious studies, hold more orthodox religious views, incorporate religious beliefs more often in their daily lives and activities, and pray more often as well (Argyle & Beit-

Hallahami, 1975; Batason & Ventis, 1982; De Vaus & McAllister Glock. 1967; Lazerwitz, 1961; Lindsey, 1990; Sapiro, 1990).

Moreover, the anterior commissure, a thick rope of axonal fibers which interconnects the right and left amygdala of the right and left temporal lobe is also sexually differentiated. The anterior commissure is responsible for information transfer as well as inhibition within the limbic system. Specifically, the female anterior commissure is 18% larger than in the male (Allen & Gorski 1992).

Thus not only is the female amygdala more excitable, but the right and left amygdala (located in the right and left temporal lobe) can more easily communicate and excite one another. Hence, again, the increased tendency for females to become easily frightened and to be religiously inclined. To know fear is to know god.

THE HOMOSEXUAL LIMBIC SYSTEM AND SPIRITUAL EXPERIENCE

Although the etiology of homosexuality remains in question, it has been shown that the ventromedial and anterior nuclei of the hypothalamus of male homosexuals demonstrate the female pattern of development (Levay, 1991; Swaab, 1990), whereas the anterior commissure, which interconnects the right and left amygdala/temporal lobe, is "hyper-female" in size (Allen, & Gorski (1992). Male homosexuals are in possession of limbic system that is more "female" than "male" in functional as well as structural orientation.

This female pattern of limbic system development also explains why homosexuals are more inclined to behave and think like women rather than men. Indeed, homosexual males and females tend to be more alike than different in regard to social-emotional reactions and tendencies (Tripp 1987). In some cases these feminine tendencies are grossly exaggerated (Tripp, 1987); i.e. the "swishy" male with the exaggerated high pitched voice.

A significant number of homosexuals, in fact, are psychologically similar to females in a number of ways, including having a high interest in fashion and wearing apparel, a pronounced tendency to employ feminine body language and vocal tones, to shun sports and avoid fights, and to have a fear of physical injury, particularly during childhood (Bell et al. 1981; Bieber et al. 1962; Van Den Aardweg, 1984; Tripp, 1987). Many also tend to maintain intense dependency relations with their mothers and to remain distant from

strong male figures including their fathers (Green, 1987).

As children homosexual males tend to prefer female companions and friends, girls toys, activities, and often girls clothes, (Bell, et al. 1981; Saghir & Robins, 1973; Grellet et al. 1982; Green, 1987). From 67% to 75% of homosexuals vs 2%-3% of heterosexual males reported being "feminine" and more like girls than boys as children (Saghir & Robins, 1973; Green, 1987).

Thus, being in possession of a "female" limbic system may not only account for similarities between homosexuals and women in regard to fear and other behaviors, but in respect to spirituality. Thus priests and shamans not only tend to be homosexuals, but public displays of overt homosexual activity and promiscuity coupled with religious fervor often comes to characterize the behavior of homosexual clergy, as was the case within the ministry of the Episcopal church, and which appears to be the case in the Catholic Church.

The homosexual limbic system, however, is actually organized in a hyper-female fashion. When compared to the female and especially the male limbic system, the homosexual limbic system could be considered different from the male and female "norm." And as noted, abnormalities in the limbic system or hyperactivity, is associated with hypersexuality, transvestitism, and public displays of sexuality (Blumer, 1970; 1999; Davies and Morgenstern, 1960; Kolarsky, et al., 1967; Leutmezer et al., 1999; Terzian and Ore, 1955).

As noted, in ancient religions, including those who worshipped the great goddess, male youths would sometimes castrate themselves, and would forever after dress as women in order to obtain her power and serves as her priests.

Goddess cults have always been associated with fertility rites and woman's sexuality. Homosexuality between women worshippers was common, whereas when men were allowed to participate, the religious service would become a sex orgy. That modern day homosexual priests with their female limbic system behave similarly, albeit with men and boys, is therefore to be expected.

"If it was good company and conversation that Adam needed, it would have been much better if god were to have arranged to have two men together as friends, not a man and a woman." -St. Augustine.

*****

****

***

V: SHAMANISM, COSMOLOGY, CONSCIOUSNESS, AND MAGIC

*****

****

***

28. Shamanism, Spirituality And Innate Brain Structures

by Michael Winkelman
Dept. of Anthropology, Arizona State University

The famous specialist of comparative religion, Mircea Eliade, promoted a universal concept of the shaman, pointing to the substantial similarities in spiritual healers in societies around the world. Eliade emphasized that the shaman was someone who entered "ecstasy" to communicate with the spirits on behalf of the community. Eliade also added that the shaman's ecstasy was a "magical flight" or soul flight, not possession; that the shaman could heal by recovering the patient's lost or stolen soul; that the shaman acted with the assistance of animal allies or powers; and that the shaman could also act as a sorcerer. In service to the community, the shaman gathered the entire local group for an all-night ceremony of singing, chanting and dancing as the shaman made the "magical flight" (or out-of-body experience) to the spirit worlds in search of needed information and power and to recover lost souls.

Anthropologist Michael Harner has referred to these worldwide practices as "core shamanism," reflecting recognition that there are basic principles of shamanic practice found in cultures around the world. These universals present a challenge to the rationalistic perspective that shamanism is like other religions, a delusion. The universals of core shamanism attest to an adaptive and empirical basis rather than an arbitrary set of beliefs. This adaptive basis for shamanism is increasingly recognized as a core feature of the emergence of modern human culture 40,000 years ago in the Middle/Upper Paleolithic transition, and played a pivotal role in these cultural advances (Winkelman 2002a). Shamanism was a central part of these cultural institutions, and literally left its symbolic imprint on the walls of caves in Europe (Ryan, 1999, Clottes and Lewis-Williams, 1998, Lewis-Williams 2002). These activities reflect the adaptive advantages of shamanic practices in human cognition, psychological development and social bonding (Winkelman 2000, 2002a). Universals of core shamanism reflect structures of the brain and the operations and processes of innate brain modules. This neurological basis of shamanism is discussed by Laughlin, McManus and

d'Aquili (1992) in terms of neurognostic structures. Neurognostic refers to neurologic structures underlying gnosis, or knowing. Shamanism involves the utilization of a number of neurognostic structures, biologically based structures for experience and knowing that underlie the universality of shamanic practices and their adaptive advantages. These universals reflect an evolved psychology of humans, characteristics acquired because of selective pressures for the advantages they provide(Winkelman, 2002b, McClennon, 2002). Shamanism was the original "neurotheology," a spiritual healing practice based in fundamental principles of the brain and its functions.

The basis of shamanism in neurobiology raises the question of why many cultures lack shamanism or other shamanistic practices. With the rise of complex societies, shamanism underwent a transformation and suffered oppressions and a demise (Winkelman, 1992). The original forms of shamanism disappeared, often being brutally oppressed by religions and state political systems, as

Harner (1973) documents in the formation of European witchcraft. However, while original forms of shamanism disappeared (or were transformed), basic principles of shamanism persisted or reemerged in transformed practices because of their foundation in neurological principles. This is seen in the widespread practices of mediumship, as well as the spontaneous re-emergence of shamanic experiences in modern peoples. These neurognostic principles underlying shamanism are also manifested today in "spiritual emergencies" and in spontaneous religious experiences.

Since the practices of shamanism had been eradicated from pre-modern European cultures, the term shaman entered English from other cultures (Flaherty, 1992). The term was subsequently attributed to practices around the world following the widespread attention it received from Eliade's (1964, originally 1951) classic book Shamanism archaic techniques of ecstasy. While Eliade's work contributed to the perception that shamanism was a worldwide healing practice involving ecstatic communication with the spirit world on behalf of the community, some people have questioned whether shamanism is truly cross-cultural, or whether it is a regionally specific phenomena restricted to Siberia. Others have taken the term shaman and extended it to practices in virtually every culture. Both of these perspectives ignore the phenomena of core shamanism and the cross-cultural differences in practices that use its neurological bases.

CROSS-CULTURAL PERSPECTIVES ON SHAMANS

The idea of core shamanism is based in recognition of structurally identical healing practices in cultures around the world. Whether or not shamanism is universal has been plagued problems of a definitional approach to shamanism. When shamanism is defined based upon a particular set of assumptions, the question of what is a shaman becomes problematic. Some people define shamanism broadly enough to incorporate almost any spiritual practice, while others define it narrowly, specifying that only Siberian cultures have shamanism.

An alternative to the definitional approach and its problems is provided by an empirical assessment of the characteristics associated with magico-religious healers around the world (Winkelman, 1986a, 1990, 1992; see Winkelman & White, 1987 for data and methods). This cross-cultural approach provides an empirical basis for establishing core shamanism and its characteristics, revealing a world-wide shamanism in small-scale societies. Interdisciplinary research indicates shamanism is found cross-culturally because it involves adaptations to psychobiological potentials of altered states of consciousness (ASC, or the integrative mode of consciousness) as well as other innate potentials (Winkelman, 2000).

Shamanistic Healers. The cross-cultural research illustrates the importance of distinguishing core shamanism and other healing practices using ASC. Shamans are found among hunter-gatherers and societies with limited agriculture or pastoral subsistence patterns and political integration limited to the local community. Shamanism was originally an ecological adaptation of hunter-gatherer societies to psychobiological structures and humans' psychosocial and therapeutic needs. This psychobiological foundation for shamanism assured the persistence of similar ASC-based healing practices as societies became more complex. I have referred to these practitioners in more complex societies as shamanistic healers, a human universal that involves healers who use ASC in community rituals to interact with the spirit world (Winkelman, 1990, 1992). Shamanistic healers share the core characteristics of shamans emphasized by Eliade—ecstasy (ASC), community and spirits— reflecting psychobiological principles. ASC are manifested universally, reflecting enhance integration of lower brain processes with frontal processes achieved through induction of synchronized

theta wave patterns in the brain. The presence of community in shamanistic healing reflects a variety of psycho-social functions and psychobiological effects. These appear to include the elicitation of neurotransmitter system functions (opioid and serotonergic mechanisms) with a variety of healing mechanisms. The use of the spirit world in shamanism is another biologically based universal. Beliefs about spirits function as a symbol system that provides personal and social identification and selfdevelopment and differentiation. Shamanistic healers share these characteristics with core shamanism because of their biological basis; other aspects of shamanistic healers differ from core shamanism because of the effects of their respective societies (agricultural, politically integrated) on healing and consciousness.

Universals of Shamans. Cross-cultural studies revealed that there are similar characteristics associated with the healing practitioners of hunter-gatherer societies, including: an ASC experience known as soul journey or soul flight; the use of chanting and music and dancing; an involvement of the entire community; training through deliberately induced ASC, particularly vision quests; an initiatory experience involving death and rebirth; therapeutic processes focused on soul loss and recovery; disease caused by attacks by spirits and sorcerers, and the intrusion of foreign objects or entities abilities of divination, diagnosis and prophecy; charismatic leadership, as well as malevolent acts, or sorcery; animal relations, including control of animal spirits, transformation into animals and hunting magic.

This paper proposes that a number of these universals can be understood in relationship to basic principles of brain operation that have intrinsic healing properties. The specific aspects of core shamanism addressed below include: the shamanic ASC, soul journey, death and rebirth, music, dance, and therapeutic processes.

THE NEUROLOGICAL FOUNDATIONS OF SHAMANISM

The evolution of human cognition has been characterized in terms of the acquisition of a modular brain structure (e.g., see Mithen [1996] for review). These theories propose human brain evolution involved the acquisition of innate modules, specific structures or functional systems that were adaptive for addressing particular kinds of tasks. Among the modular systems attributed to humans are those for: language, music, mimesis (imitation), animal species classification, self-recognition, inference of other's mental

states ("mind-reading") and tool use. Contradictions to the processes of the innate modules have been proposed as providing the basis for religious thought (Boyer 2001); I suggest that we can understand many universals of shamanism in terms of the representations produced through the integration of the processes of these innate modules.

The operation of innate structures of the brain underlie the foundations of shamanism emphasized by Eliade— ecstasy, the spirit world and community — as well as other universal characteristics of shamanism (e.g., death and rebirth, soul journey, music, dance). Ecstasy, or altered states of consciousness (ASC), involve a mode of consciousness; these natural physiological conditions induce the relaxation response, synchronization of brain waves and integration of the evolutionary levels of the brain. The spirit world involves the use of innate representation modules for understanding self, social others, and their mental capacities, a natural psychology based upon human characteristics. Shamanic universals of animism, animal spirits, guardian spirits, and soul flight involve manipulation of these modules in understanding nature, and in the management of personal and social identities. Community represents the importance of social others in synchronizing human psychobiological functions. Shamanic healing manipulates the paleomammalian brain structures to produce emotional healing by evoking socioemotional and psychodynamic processes, strengthening social identity, and eliciting the body's opioid and immunological systems.

THE PSYCHOBIOLOGY OF SHAMANIC EXPERIENCE

"Ecstasy," trance or ASC has been recognized as central to shamans' selection, training and professional practice. The biological aspects of shamanic ASC are obscured by the many different procedures used to induce them (e.g., auditory driving through procedures such as drumming. clapping, singing and chanting; fasting and water restrictions; prolonged periods of sleeplessness, or deliberate periods of sleep for dream incubation; austerities such as temperature extremes and painful exposures or mutilations of the body; and hallucinogens and other plant medicines in some traditions). In spite of this variety of induction practices associated with shamanism, most procedures have the same basic overall physiological effects (Mandell, 1980).

Shamanic ASC typically involve singing, chanting, drumming and

dancing, followed by a phase of collapse and apparent unconsciousness. The overall physiological dynamics involve an activation of the sympathetic division of the autonomic nervous through drumming and dancing until exhaustion of the sympathetic system from extreme exertion leads to collapse into a parasympathetic dominant state characterized by the relaxation response and intense visual activity. This same stimulation and collapse cycle is produced by many other procedures, including: fasting, sleeping and dreaming, hallucinogenic drugs (or psychointegrators [Winkelman, 1996]). Sometimes shamans enter this phase of relaxation ASC directly through withdrawal and an internal focus of attention, rather than extensive induction procedures and the sympathetic system stimulation.

The shamanic ASC is one of several states of consciousness that occur in the integrative mode of consciousness, part of the cycles of homeostatic balance in the nervous system. The biological basis of the integrative mode of consciousness is reflect in the presence in all cultures of procedures for accessing ASC (Laughlin, McManus and d'Aquili, 1992, Bourguignon, 1976). Although societies differ in their attitudes towards ASC and the means for controlled access to them, institutionalized procedures for entering ASC are found in virtually all societies because they are part of human nature and the normal functions of the brain. The universals of shamanistic practices reflect underlying brain structures and functions that reflects a normal brain response to diverse stimuli. These responses induce synchronized brain wave patterns, typically in the theta (3-6 cycles per second [cps]) and slow alpha (6-8 cps) range.

These brain wave patterns are produced by activity in the limbic system, also referred to as the emotional brain and the paleomammalian brain. These discharges first establish linkages between the limbic system and the lower brain structures, integrating information from the whole organism with emotions and memory. These connections produce strong theta wave patterns mediated by the action of the serotonin circuitry. These synchronized theta patterns produce ascending discharges, sending impulses up the neuraxis of the brain (a nerve bundle running from the bran stem up into the limbic system and frontal parts of the brain). These synchronous discharges reach the frontal cortex, where they replace its normal fast and desynchronized brain wave activity with the coherent slow wave discharges in the alpha and theta range (Mandell, 1980; Winkelman, 1986b, 1992, 2000). The overall

effect of the shamanic ASC is to dominate the frontal part of the brain with information from the emotional and behavioral brains. This integrates the information and processes of these preverbal brain structures into the personal and cultural systems mediated by language and the frontal cortex.

Soul Journey: Self in Presentational Symbolism. The shaman's ASC is characterized as a "soul journey" or "soul flight," although the shaman's ASC may take several forms, including a visit from the spirit world or a transformation into an animal. Although possession is associated with some shamanistic healers (e.g., mediums) it is not characteristic of core shamanism. The shaman's soul journey is a neurognostic structure, a biologically based experience attested to cross-culturally (e.g., astral projection, out-of-body-experiences, near death experiences). The experience of flight and vision associated with the soul journey is a natural response of the human nervous system. Hunt (1995) proposes that the experience of soul flight involves representation of self from the "other's" perspective. Soul journey involves the prototype of "taking the role of the other," seeing oneself from another's point of view. In the soul journey, this perspective is represented in the visual spatial modality, involving what Hunt refers to as a presentational symbolism. This is a symbolic system that operates independently of language, providing a medium for an externalized self-representation. These experiences provide new form of self-awareness not tied to one's ordinary self and body, and create the shaman's transcendence of ordinary awareness and identity.

COMMUNITY RITUAL AS A PSYCHOBIOLOGICAL THERAPY

Eliade emphasized that shamanic healing was on behalf of the community, and shamanistic healing occurs in the context of the local community. Typically all members of the community were expected to attend what was characterized by Eliade as "a spectacle unequaled in the world of daily experience" (1964:511). These group rituals are not uniquely human, but also have a significant role in animal societies. The wide distribution of group rituals in the animal kingdom attest to their sociobiological importance. In humans, the collective presence of a community produces therapeutic effects derived from both psychosocial influences (positive expectation and social support) and psychobiological effects. Collective rituals strengthen group identity and community cohesion not only through social processes,

but also through their effects upon human psychobiology. Communal activities also elicit and reinforce attachment needs in the mammalian biosocial system (Kirkpatrick, 1997, Frecska and Kulcsar, 1989) and appear to elicit psychosociophysiological mechanisms that release endogenous opiates (see also Prince, 1982). The attachment and affective bonds that evolved in mammals to maintain proximity with infants provide a secure basis for the self in the feelings of protection from powerful figures.

These affective bonds are used in shamanistic ritual, which reinforce these innate mechanisms for attachment with the cultural symbols and neurognostic processes. Frecska and Kulcsar review evidence that shamanic rituals elicit psychobiologically mediated attachment processes that are based in the body's opioid mechanisms. Shamanic rituals use cultural symbols that have been cross-conditioned with patterns of attachment and their physiological and emotional responses. The emotionally charged cultural symbols that were associated with physiological systems during early attachment relations and socialization processes provide a basis for elicitation of the opioid system in shamanistic ritual. The ritual use of symbols associated with physiological reactions enables shamanic ritual to manipulate physiology. The release of endogenous opioids by a variety of physical activities associated with shamanic ritual has also been noted (e.g., see Prince, 1982, Winkelman, 1997). These shamanic activities that stimulate release of the body's own opioid system include: exhaustive rhythmic physical activities (e.g., dancing and clapping); exposure to temperature extremes (e.g., cold or sweat lodges); and austerities such as prolonged water deprivation and fasting, flagellation, and selfinflicted wounds. Opioids are also elicited by emotional manipulations involving fear and positive expectations, as well as the nighttime activities typical of shamanic ritual, when endogenous opioids are naturally highest.

The release of natural opioids stimulates physiological processes, including the immunological system (Frecska and Kulcsar, 1989). Activation of the opioid system also produces a sense of euphoria, certainty and belongingness. These processes enhance coping skills and the maintenance of bodily homeostasis (Valle and Prince, 1989). Endogenous opioids reduce pain, enhance tolerance of stress, facilitate environmental adaptation, and enhance psychobiological synchronization within the group. These processes enhance group solidarity in a sense of communitas, the experience of the

essential bonds among group members. Enhancement of community identity promotes the dissolution of self-boundaries and enhances the sense of identification with others. This reinforces individual commitment to the group and promotes the development of an integrated sense of self.

Chanting and Music: Innate Expressive Social Capacities. The use of song and chanting are universal aspects of shamanic healing ritual. These activities not only induce an ASC, but also reflect expressive community communication processes that utilize innate modules. Chanting practices associated with shamanism reflect a biologically based capacity with deep evolutionary roots.

These vocalizations have progenitors in the song, call and other vocal expressive systems found in other animals (Molino, 2000). These expressive capabilities that humans share with other primates were extended in human evolution, but continue to share functions as a communicative and expressive system. These vocalizations involve states of high arousal to communicate about affective states and alarm; to modulate social contact and spacing; for mate attraction, pair bonding and bond and territorial advertisement; to motivate other members of the group; interindividual and intergroup communication, particularly regarding location, spacing, food sources and danger; and to enhance group cohesion and unity (Geissmann, 2000). Music's adaptive roles include its ability to promote group cohesion and coordination, enhancing synchrony and cooperation among group members.

Music strengthens group cohesion through mutual cognitive and emotional expression and coordinating the behavior of different individuals into synchronized performances (Brown, 2000, Merker, 2000).

Mimesis and Dance. The shaman's dance is a core aspect of shamanic practices found around the world. Dancing is part of a larger group of cultural activities such as chanting, singing, poetry and play that share common modules that provide rhythm, affective semantics and melody (Molino, paraphrase p165, 173). This rhythmic module of the brain provided an expressive system that predated language (Donald, 1991). Freeman (2000) suggest that music and dance coevolved to enhance social bonding and communication of internal states, contributing a technology for inducing ASC and breaking down existing habits and thought patterns. The close linkage of musical expression with movement and dance reflects the operation of an innate brain device known as the "mimetic controller," which

provides the unique human ability to entrain the body to external rhythms (Donald, 1991). The effects of music include a compulsion to move with the rhythm, including shaking, clapping, stomping and dancing, reflecting the operation of this innate mimetic controller. Group ritual dances and vocal imitation of animals were among the first of human mimetic activities. The

mimetic controller provides the basis for the ability to represent through imitation, as well as gestural and facial representations and the rhythmic coordination of behavior of individuals. Mimesis provides a basis for a shared culture through enactive symbolism. The shaman's use of dance, imitation and drumming reflect the utilization of this innate mimetic controller, which provides mechanisms for producing coordination among a group. This communication system of the body involves a "rhythmo-affective semantics" that expresses the fundamental emotions (Molino, 2000). Mimesis is still the primary mechanisms through which humans learn social roles and physical skills. This mimetic ability expressed through imitation and ritual produced a mythic ethos that was enacted early in human evolution in activities involving collective participation. These behaviors have direct continuities with animal ritual (see McClennon, 2002). Similarities with ape ritual are seen in their locomotor displays involving kicking, stomping, shaking branches, beating on the chest, ground or vegetation, and jumping and running (Geissman).

SPIRIT AS BIOPSYCHOSOCIAL STRUCTURES OF SELF AND OTHER

A central feature of shamanism is the interaction with the spirit world. This belief in spirits is part of a broader cognitive framework known as animism. Animism is the belief in a soul or vital principle that animates entities, producing their behaviors and other observable properties. While animism has been viewed historically as a delusional system of belief, contemporary perspectives consider animism in a different light. Animism, or spirits, reflect basic principles of human consciousness. Spirits reflect fundamental operations of the nervous system and consciousness and a basic forms of knowledge of the world that operate at non-verbal pre-linguistic levels of conceptualization, reflecting processes of what the neurobiologist Paul MacLean (1990, 1993) refers to as paleomentation. These paleomentation processes include activities of the paleomammalian brain, or

limbic brain, that engages in processes related to self, emotional attachments and the feelings of certainty regarding one's convictions. These brain processes also provide representations central to consciousness, a sense of self and others, operating on structures that function outside of conscious awareness.

Animism is a universal of human cultures, based in conceptual processes that consider other phenomena to be fundamentally like humans. Animism is a basic form of projection of cognitive similarity, attributing our own characteristics to unknown others. Animism is generally manifested in anthropomorphism, which involves the attribution of human characteristics—self, emotions, mind and identity—to non-human entities (Guthrie, 1993). The attributions to spirits are based in a metaphoric extension of the properties of the self for modeling the unknown other. Spirit beliefs also reflect social structures of the group and the dynamics of social and interpersonal relations. This human tendency to animate the natural world with human-like principles is a form of relational knowing that establishes human relations with the environment. Animism plays a fundamental role in the construction of a sense of self-identity and communal identity (Bird-David, 1999).

The concepts of spirits represent a language of intrapsychic dynamics of the self and psychosocial relations with others. Consequently, spirits constitute a natural symbolic system for manipulating unconscious aspects of self, personal and communal identity, and psychosocial relations with others. Viewing the spirit world as a conceptual framework for representing aspects of self and others enables an understanding of how ritual manipulation of spirit constructs can have effects upon attachments and emotions. Shamanic systems consider spirits to be the most fundamental causes of illness; they also reflect fundamental structures of self and others and generic aspects of consciousness. Shamanic ritual elicits these primordial psychocognitive processes and forms of communication, and uses symbolic processes to manage self concept, emotional well-being and relationships with social "others." The spirit processes of shamanistic healing make maladies meaningful in both the context of cultural life, and in relationship to innate structures of self-perception. These neurognostic based systems of meaning provide a basis for understanding personal psychodynamics through an innate body-based system of meaning (Laughlin, 1997). This body based references

system is also fundamental to the shamanic journey— or "out-of-body experience." Shamanic healing rituals entrain these innate structures with cultural symbolic processes, allowing healing to emerge from unconscious integration (Winkelman, 2000).

Spirits can be understood in terms of symbolic systems that represent "complexes," which are organized perceptual, behavioral and personality dynamics that operate independent of, or dissociated from, ordinary awareness and social identity. Shamanistic healing practices addresses these dissociated personality complexes by eliciting the holistic imperative, a drive toward integration across levels of consciousness (Laughlin et al., 1992). These complexes, representing un-integrated aspects of self, are manipulated in shamanic rituals to produce healing by re-structuring and integrating the unconscious dynamics. Shamanic healing integrates the self, utilizing visual and corporeal processes to unite unconscious information with the conscious mind. Shamanic ritual provides a number of mechanisms for elicitation of the emotional unconscious and re-alignment of the individual with social expectations and cultural meaning systems.

Death and Rebirth. An aspects of self and identity produced through shamans' ASC are illustrated in a universal feature of shamanic training, a "death and rebirth" experience. This death and rebirth experience may occur spontaneously, as a result of illness or injury, or during the active pursuit of shamanic power. During initial training and development, the shaman neophyte experiences a crisis of illness and suffering involving attacks by spirits which lead to personal death. This death is followed by a destruction of the victim's body and its reconstruction with the addition of spirit allies and powers. This death and rebirth experience reflects neurognostic processes of self transformation, constituting a natural response to conditions of overwhelming stress and intrapsychic conflicts (Walsh, 1990). These experiences are the result of the fragmentation or breakdown of the ego, experienced in "autosymbolic images" of the destruction of one's body and self (Laughlin et al., 1992). Shamanic healing in response to this death and rebirth also activates innate drives towards toward psychological integration. Shamanic rituals manipulate symbolic and physiological structures to restructure the ego and producing a new self identity. This restructuring is promoted by holistic imperatives toward psychointegration, and provides the basis for the exceptional health of shamans.

SPIRIT RELATIONS AS ROLE TAKING: INCORPORATING THE "OTHER"

Humans have an innate capacity to "take the perspective of others." Humans can infer other's mental states, using their own minds to infer the mental states and motivations of others. This capability enables humans to incorporate others into self-identity, to use the models of "others" to augment and model the self. Shamanism uses this capability to provide therapeutic processes through role-taking (Peters & Price-Williams, 1981). The processes of role-taking are exemplified in the shaman's spirit world interaction, where shamans enact the personalities of the spirits. The interactions with the spirit world provide representations of personal and social psychodynamics, including emotions, attachments, social influences and behaviors. These representations allow shamanic rituals to affect the psychodynamics of the patient. Shamanic manipulation of the spirit world produces therapeutic changes because the spirits represent fundamental aspects of the self. The shaman's dramatic enactment of interactions with spirits provides models for self development and socialization. The innate capability to incorporate the "other" enables the spirit systems to contribute to identity modification. This occurs through the internalization of spirit behaviors, as well as the capabilities inherent in animal allies and powers.

Shamanic self-development is exemplified in the basic training activities of shamanism, the acquisition of animal powers and the vision quest, or guardian spirit quest. These involve seeking a personal relationship with the spiritual world through the development of a personal relationship with spirit allies, powers and guardians.

The shamanic systems of animism, totemism and guardian spirits provide natural symbolic systems for the development and differentiation of self. The cultural processes of shamanism manipulate these natural systems to create natural symbolic systems for the representation of self and alternate forms of self, providing mechanisms for problem-solving and psychosocial adaptation. The spirit identities provide a range of self-concepts to mediate conflict among biological, psychological and social priorities.

Animal Allies and Totemism. Animals play a central role in shamanic practices and beliefs. Animals are the basic allies and spirit helpers of shamans, who are generally considered to be "master of the animals" or have

special relationships to the deities and natural forces that control animals.

Shamans are typically called upon to assist in hunting, and are generally believed to be able to transform themselves into animals. These universals of shamanism involving animals reflect the use of another innate module of the brain. Mithen refers to this as the natural history or intuitive biology module. This involves specialized innate capacities for organizing knowledge about animals and recognizing "species essence." This ability is manifested in the universal human ability to organize information about animals and produce taxonomical classification schemas for the natural world.

This innate capability provides a universal analogical system for creation and extension of meaning. The use of animal species for representation is manifested in the phenomena of spirit allies and totemism. The anthropologist Levi-Strauss (1962) characterized totemism as involving the estab-

lishment of metaphoric relationship between the natural history domains of animals and social groups. In totemism, human groups are distinguished by attributing the characteristics derived from the animal world. Totemism involves human thought about the identity of humans and social groups in terms of the models provided by animal species. The use of animals is social and cognitive modeling is one of the most fundamental aspects of metaphoric and analogical thought, a universal human system for expression of meaning and creation of social and personal identity.

Guardian Spirit Complex. The use of this innate system for recognizing species essence is also manifested in the practices of the guardian spirit complex. Shamanism utilizes the natural history module in incorporating animal spirits as powers or allies, as aspects of the personal powers and identity. In hunter-gather societies, this guardian spirit quest was not specific to shamanism, but central to development of adult skills and competencies. This was part of the transition to adulthood, guiding the individual in personal and social choices and commitments in life (Swanson, 1973).

These guardian spirit interactions provided personal powers, strength, and assistance in making one's decisions about social choices for adult life. These animals with whom shamans have personal relationship have psychosocial functions in empowerment and in providing a representational system for self-development and self-differentiation. This was illustrated in the widespread North American guardian spirit complex focused on the guardian

spirit quest. This role of animal spirits as representing aspects of one's self reflects a fundamental aspect of shamanistic thought, that of the "sacred other" (Pandian, 1997). The intersection of the animal spirit with personal identity involves cultural processes for producing symbolic models for the self. The animal spirits provide projective systems for psychosocial relations and ideals that structure individual psychodynamics and social behavior.

Pandian suggests that the "shamanistic sacred self" provides models and processes for protecting individuals from stress and anxiety and the management of emotions. These animal identities also provide alternate forms of self representation to facilitate social adaptations. The alternate senses of self that animal powers provide are mechanisms for problem-solving and conflict management. Animal spirit concepts of self provide a system of variable command-control agents that facilitate the mediation of personal and social conflict. These animal spirits provide alternate sense of identity that can mediate conflict between the different aspects of self and instinctive agents. This helps mediate a hierarchy of personal and social goals. Shamanic animal powers provide processes for constructing and manipulating a variety of selves for psychological and social integration.

SHAMANISTIC THERAPIES: A BIOPSYCHOSOCIAL APPROACH

Shamanic rituals use ASC, community relations, and interactions with spirit-world constructs to manipulate physiology, psychology and social relationships for therapeutic benefits. This reflects the ability of shamanic practices to evoke an integrated biopsychosocial healing process that elicits not only symbolic and social processes, but also physiological responses.

ASC AS HEALING PRACTICES

Shamanic ASC exercise therapeutic effects through a number of processes. These include the induction of a condition of parasympathetic dominance in the autonomic nervous system and a synchronization of information across the levels of the brain, particularly limbic-frontal integration and synchronization of the frontal hemispheres. These produce physiological processes underlying shamanic healing mechanisms, including: physiological relaxation, producing a reduction in tension and stress; regulation of psychophysiological processes, reducing anxiety reactions and psychosomatic effects; providing accessing to suband unconscious

information; integration of behavioral, emotional and cognitive processes; enhancement of social bonding and group integration; and facilitating positive emotions and social attachments.

Shamanic ASC induce a parasympathetic dominant state that evokes the relaxation response. This generalized decrease in sympathetic nervous system activity has therapeutic value, reducing stress related physiological conditions. Rapid induction of the parasympathetic dominant state can also cause the erasure of conditioned responses (learned behaviors) and produce dramatic changes in beliefs by increasing suggestibility and placebo and psychosomatic effects. ASCs activate pre-conscious brain processes, allowing integration into the conscious mind of psychodynamic material that is normally inaccessible. These repressed conflicts affect emotions and physiological responses.

Enhance expression of these repressed aspects of self through giving expression to non-verbal information can have therapeutic effects through enhanced integration of he psyche. ASC evoke limbic system functions that manage emotional mentation, self and social identity processes related to interpersonal bonding and attachment. These contribute to healing through producing an integration of emotional information into consciousness. ASC produce theta wave entrainment, an integration across hierarchical brain levels. This integration of preor unconscious functions into conscious awareness involves an enhanced integration of cognitive and emotional processes. This integration of information from different functional systems of the brain enhances learning, attention, memory and adaptation to novel situations (Mandell, 1980).

The effects of shamanic ASC may be inferred from research on the physiology of meditation. Some scientists believe that there are neuroendocrine mechanisms of meditation that involve stress reduction through enhancement of serotonin functioning and stimulation of theta brain-wave production (Walton and Levitzky, 1994). Meditation lowers autonomic arousal and enhances brainwave coherence in theta frequencies. Meditation effects upon serotonin levels have the effect of reducing cortisol levels, and consequently the anger and fear reactions. The meditation research implicates the same mechanisms that Mandell (1980) postulates as generic to transcendent states. This involves serotonergic mechanisms that are manifested in synchronous high voltage slow frequency brain waves (alpha,

theta, and delta activity, especially 3-6 cycles/second) that link the limbic system and behavioral brain. This slow wave synchronized brain waves drive their impulses into the frontal cortex, linking its processing to the lower brain structures.

EMOTIONAL HEALING PROCESSES

The processes of shamanistic healing involve the generic processes of all spiritual healing systems, the provision of meaning. The sense of meaning instilled by shamanism provides healing through multiple mechanisms that link the individual to a sense of socially-mediated well-being. Shamanic meaning systems have a neurobiological basis in the functions of the limbic, or emotional, brain and its processes related to assurance of psychological well-being and attachment. The neurobiologist MacLean has referred to these as emotiomentation processes, affective evaluation processes that provide an assurance of a meaningful and controllable world that counteracts anxiety and its detrimental physiological effects. Social processes and spirits provide explanations that meet human needs for assurance, instilling confidence and a sense of certainty. Shamanism uses symbolic manipulations that have the potential to intervene in the stress mechanisms of the general adaptation syndrome. Shamanic ritual may alleviate high levels of activity in the pituitary/adrenal system, curtailing the resistance stage of the stress reaction through changing emotional responses that upset the balance in the autonomic nervous system. Shamanic ritual and its effects upon social bonding manipulate emotional processes and their physiological consequences, providing effects upon both body and mind. An aspect of shamanistic healing involves the elicitation of placebo responses through instilling the expectation of well-being.

Shamanic healing activities address social-emotional dynamics through many processes: the community integration involved in soul recovery and object and spirit extraction; eliciting community support systems that meet fundamental human needs for a sense of belonging and bonding with others; evocation and restructuring of painful memories (catharsis and abreaction); and confession and forgiveness as processes for resolving intrapsychic and interpersonal conflict. Shamanic healing typically externalizes guilt, attributing it to the action of spirit forces; this helps minimize the sense of personal responsibility and guilt, reducing negative emotional process. Ritual

operates through metaphoric processes that manipulate affective responses independent of the rational mind. This enables shamanic ritual to reorganize emotional dynamics, reprogramming emotional brain processes through songs and psychodramatic enactments that have the ability to change self-perception and social relations.

Shamanism's use of the production of meaning to heal involves the universals of symbolic healing (Dow, 1986). This involves particularizing a client's circumstances within their cultural mythology, and then ritually manipulating that mythological system to transform the their emotions and self-system. This ritual manipulation is primarily achieved through the mechanisms of the spirit world. Shamanistic ritual uses spirit concepts to connect with innate drives toward self-differentiation and identification with "others" enabling self-reorganization and integration (Laughlin et al., 1992). These processes connect with innate tendencies to integration of identity at higher levels of self-integration, and identification with more powerful others, symbolically transforming the self.

CONCLUSIONS: CONTEMPORARY MANIFESTATIONS OF SHAMANIC NEUROGNOSTIC STRUCTURES

The neurological foundations of shamanic features allows for their persistence in contemporary society. This is reflected in contemporary illness in psychiatrists' diagnostic categories of "spiritual emergencies. These include: spontaneous shamanic journeys; the death and rebirth experience; mystical experiences with psychotic features; and expressions of psychic abilities (Walsh, 1990). The shamanic paradigm provides a framework for addressing these experiences as natural manifestations of human consciousness and as developmental opportunities. The neurognostic framework helps explain why the shamanic phenomena spontaneously manifest and why the shamanic approach is a more successful therapeutic approach in addressing these natural manifestations of consciousness. The shamanic paradigm re-interprets what psychiatry considers symptoms of acute psychosis and emotional disturbance as opportunities for personal development. The psychobiological basis of these shamanic experiences allows shamanic counselors to treat these conditions as natural and elicit brain processes that provide opportunities to develop control over these experiences. Treating death and rebirth, soul loss, out-of-body experiences,

power loss, animal familiars and spirits as natural manifestations of consciousness enables people to engage in the classic shamanic approach of selfempowerment to address these experiences.

Although shamanism has been regarded as an ancient human healing tradition, its modern resurgence indicates that shamanism's dynamics are here to stay. Instead of pondering the reasons for a "return to superstition," the neurognostic framework provides an understanding of these phenomena as natural phenomena of consciousness. Shamanic traditions of altering consciousness, ritually manipulating identity and changing psychosocial dynamics through adopting animal and spirit world identities are still relevant. Shamanic traditions are rooted in human psychobiology and brain dynamics, assuring their continued relevance. Their persistence in traditional societies and their resurgence in the modern world is testimony to the need for shamanic healing. Shamanic healing practices may not only be good complementary therapies, but they may also provide important alternatives to biomedicine by addressing the biopsychosocial dynamics of human health and illness. Shamanic healing can open new avenues for all healers by ritually addressing the innate brain processing modules for knowledge about mind, self, others and nature and manipulating these natural models of self for further development.

29. Exploring The Contours Of Mind & Consciousness Through Magical-Spiritual Techniques

by Manie Eagar & Enmarie Potgieter
Rand Afrikaans University & Apeiron Institute, South Africa.

Although, on the surface, the techniques and style might differ, the path to altered states of consciousness can be strikingly similar when you compare the experiences of practioners from all over the world.

Two comparisons are made in this paper the approach to and achievement of trance states of the San Bushmen in South Africa, and the traditions of

working with the sacred plants of the Amazon, specifically San Pedro and ayahuasca. These trance, or altered, states, are expressed through dance, singing and artwork.

Both South African bushmen and indigenous South American Indians express themselves in this way, and the historical context in both instances will be compared down to present times where 'living tribes' express these traditions in modern themes of trance dance and song. This has been given a modern context and 'urban shamans' have adopted some of these techniques to project into other, altered or 'all potential' states of consciousness, which is being thoroughly researched.

This chapter concludes that all minds are landscapes to be traversed and explored by a multiplicity of techniques and approaches – literally that an archaeology of mind is available to us and that an ecology of consciousness can be evolved from these recorded experiences and related research. In a broader sense, the farther reaches of the conscious and unconscious mind are being explored increasingly through both scientific and experimental methods by using a variety of psycho deconstructive and integrative techniques – from the shamanistic 'manufacturing of reality' by deconstructing boundaries of sense-making reality, to the reality and consciousness-making of artificial intelligence, studies into animal and plant sentience, as well as psychonautic explorations into other 'dimensions' of reality and consciousness constructs. It is a netherworld, a 'twilight zone', of either or neither that has attracted, and been navigated by generations of psycho-spiritual seekers and mind explorers in the form of artists, poets, philosophers and the modern-day high priests of science and cyber shamans.

A variety of traditional and modern magico-spiritual techniques centering on achieving altered states of consciousness have evolved to project will and intent towards specific outcomes either for personal development, therapeutic applications and for mundane, personal use. These practices have evolved into 'cyber shamanism and psychonautics' through a variety of ecstatic techniques such as gnosis, breathing, meditation, visualisation, and the use of psycho-integratives (entheogens such as San Pedro and ayahuasca), tantric practices and ritual.

This chapter will draw on the latest insights into magical technique, modern science of the mind, quantum physics, genomics, memetics, consciousness studies, altered states/realities (by whatever means), shamanic

and ritual traditions to investigate its universal applicability and the essential 'pathways' for the next generation of consciousness exploring practitioners and seekers.

INTRODUCTION

In the beginning there was the body – bound physicality with a locale and a purpose the survival of the body. This body evolved over time and grew an increasingly more intelligent and conscious sense-making tool – the brain. To travel through this landscape into which it was deposited the body, and its sense-making tool, the mind, also produced a mirroring, reprogrammable, data sifting capacity to enhance its chances of survival and with the added ability to conjecture, to imagineer beyond the boundaries of physical body and the sense of self – into the future, whilst looking back onto lessons of the past for as far as its memory banks will allow.

For the last few tens of thousands of years, it is clear that this sense-making capacity has evolved to the point where the mind within the body can literally project beyond itself and its physical locale in the landscape – both the inner (the mindscape) and the outer (the realm of physical objects – both animate and inanimate) whilst traversing through the geographical world. Some things made sense was within the grasp of the senses. Most things did not and became the realm of mythmaking.

The big question of time and life's trajectory is succinctly stated by the hero Deckard in the science fiction movie Blade Runner, "All he'd wanted were the same answers the rest of us want. Where did I come from? Where am I going? How long have I got?" This question has preoccupied every sensate human and finally humanity as our cultural communication and sense-making base started to grow to the point were it spans VALIS-like across the planet thanks to the Internet – a model of interpenetrative, boundaryless sense of knowing.

The term 'VALIS' is the science fiction author Philip K. Dick's acronym for 'vast active living intelligence system' which he defined further as a 'spontaneous self-monitoring negentropic vortex … tending progressively to subsume and incorporate its environment into arrangements of information' (Davis, 1998). VALIS is an example of a personal sense-making myth created by Dick to understand his view of and journey through his mindscape and his external landscape, in the same way that any religion or belief system

is a sense-making myth for any grouping of people.

For the ancient questing shaman this became a matter of life and death – knowing the cycles of time, the times to hunt, the times to seek shelter, when to mate, when to move across this dangerous foreign landscape in which he and his tribe were located – meant pushing the limits of what he or she could do with their sense-making tool, the mind. And the short answer is, much as we experience today, most things do not make sense and do not seem to have the same humanlike bound-within-abody purpose as we enjoy it.

The environment from which we are spawned itself is a vehicle for shaping boundaries on the edge of space and time and the quantum flux, at the exact boundary were extropy and entropy meets. This balancing act of the bound and boundless has moulded us inside our skins for purposes of survival and imbued us with a lifespan, similar to our android protagonist Roy in Blade Runner, with a limited lifespan, for such are the cycles of time. The description 'boundless' can be thought of in the sense of 'apeiron'. For the Pre-Socratic Greek philosopher, Anaximander, this conception of apeiron as externally unbounded is rooted in the word's use to mean 'ring' or 'sphere,' on whose surface one may travel for an indefinite period of time without coming to a bounding line (Rohr, 1995). For we are hunters of time, bound in dimensional space, attempting to make sense, interpret, conjecture, speculate, and roll the dice again as we go along. Such is the nature of our being (here).

There is an old passage written by the Venerable Bede, quoted by noted Nobel Prize-winning theoretical physicist Steven Weinberg, that has preoccupied our minds for a very long time, when we sit with shamans at smoky fires, or participate in some sense-making magickal ritual, or listen to psychonauts as they conjecture over and integrate their journeys after returning from an ayahuasca ceremony, or trance dance the night away with some revellers, or at a solitary zazen retreat at a Buddhist monastery sitting for ten hours a day for three weeks. The Venerable Bede ponders the issue that "…man appears on earth for but a little while; but of what went before this life or of what follows, we know nothing".1 But for us the curiosity remains.

Our challenge to such thinking is – can we ever know enough. Have we reached the boundaries of our sense-making capacities? We think the human is far too curious a monkey (the eastern philosophers accuse western thinkers

of having ‘monkey mind’ and for good reason – our curiosity is insatiable). Is there a point where one would ever close off all avenues of query and relax into a state of simply being. We do not think so. In many ways many histories of mankind have been written, and will simply become footnotes in the broader tapestry of knowing, of expanding mindscapes and landscapes, of history and sense-making that we ourselves have yet to traverse.

At issue here is do we lack the sense-making capacity to see, feel and be conscious of meaning beyond our physical selves, and beyond the cycle of life and death. This is the Sisyphean task of the shaman as he/she grasps beyond the immediate realm of the now into the realm of the witches, the hagazussa (German for ‘fence rider’), between the worlds, the world of peripheral vision on the boundary of sense-making.

In the words of science fiction mythmaker Philip K. Dick, “But I have never had too high a regard for what is generally called ‘reality’. Reality, to me is not so much something that you perceive, but something you make” and “The world of the future, to me, is not a place but an event. … a construction which there is no author and no readers but a great many characters in search of a plot” (Sutin, 1995. p. 204).

It is a world in which we manufacture our own reality as a conscious, knowing, active expression and manifestation of our purposeful, sense making self (willed existence) through the manipulation of our present reality/ies. Each instant, a personal ‘through the looking glass’ conglomeration of contexts. I become ‘my habits of acting in context and shaping and perceiving the contexts in which I act’ (Bateson, 1978. p. 275).

ENTER THE SHAMAN

It is the world of the shamans that we now enter and psychonavigate mindscapes that do not regard themselves as bound by space and time, or this or any other reality.

Our journey inwards and outwards starts with the (San) Bushman of Southern Africa, who left behind the world’s richest heritage of Stone Age rock art (the earliest dating has been made at 26 000 BCE, contemporaneous with the Upper Palaeolithic art of Western Europe; the Lascaux cave paintings date from 17 000 BCE). Initially seen as merely ‘caveman doodles’ and ‘bush graffiti’, the latest research has uncovered the layers of sense and mythmaking that envelop this hugely rich tapestry of symbolised human

consciousness.

For the Bushman his rock art is a unique record of altered states of consciousness, even alternate states of consciousness, as perceived and experienced through trance dance and the raising of boiling energy (a potency, like electricity, called !gi, or /num). These shamans are the 'owners of, and full of potency' and whose task it is to control it for the good of the people. For these myths were both personal and tribal – the whole community participates, supports, and draws on this mythmaking process to this day through their trance dances and subsequent healing rituals (Lewis-Williams and Dowson, 2000).

In the case of their rock art "…we realise that the San conceived of the cosmos as layered..." For them "The rock face was like a veil suspended between this world and the realms inhabited by spirits and spirit animals." "Everything painted on the 'veil', no matter how secular the images may seem to us, was in fact set in a spiritual context and contributed to the dissolution of distinctions between the material and the spiritual worlds" (Lewis-Williams and Dowson, 2000, p. vii). "When viewing Bushman rock art, we should remind ourselves that we are looking at a bridge between two worlds" (Lewis-Williams & Dowson, 2000, p. 36).

These magico-spiritual techniques (they did not practice sympathetic magic as was originally thought) are taught to apprentices and passed on from generation to generation through dance rehearsals, to the point were they even face and keep in view the rock paintings made by the tribal shamans (the 'owners of potency', the n/om k"ausi) to heighten the level of their own potency as they enter trance states and the days of 'eland power'. Blood from the eland was used in the paintings which became storehouses of potency. This made contact with the spirit world possible, guaranteed humankind's existence by facilitating healing, rain-making and animal control, and, by flowing between nature and people, gathered up all aspects of life in a single spiritual unity.

It is estimated that about half the men and a third of the women in a Kalahari Bushman camp may be shamans. The Bushmen of today hardly ever use hallucinogens. They rely instead on hyperventilation, intense concentration and highly rhythmic dancing to alter their state of consciousness. It is likely that, having recovered from the trance state, the shamans remembered and then depicted their experiences while in a normal

state of consciousness.

Having recovered from trance hallucinations, shamans in other parts of the world also experience after-images which may recur for many months after a trance experience. These after-images may last for a few seconds or up to a few minutes. They seem to float before one; or, if one is looking at a flat surface like a wall or a ceiling, they are like colour slides projected on a screen. Projected onto the wall of a rock shelter, such mental images could have provided the inspiration for painting (Lewis-William & Dowson, 2000).

In the trance, the shaman enters an altered state of consciousness, triggered by rhythmic dancing, their dancing rattles, and thudding steps, clapping and chanting. The Bushmen activate a supernatural potency that resides in songs and in the shamans themselves. This potency 'boils', rises up the shamans' spines and they enter trance. They call on the power of spirit animals to allow them to heal their people, and feel like they have animal characteristics themselves and that the power flows painfully from themselves. Both the Cape and European rock paintings show humans with animal features, and people twisting in apparent pain from arrows piercing their body. These represent the experience of being a shaman (Lewis-Williams & Dowson, 2000).

"The shamans' experiences and practices have fundamental similarities around the world because they reflect innate brain process and experiences" (Winkelman, 2000). Further support for this idea comes from psychologists looking at what happens to people in altered states of consciousness or with altered brain function. For Lewis-Williams and Dowson (1998), this is a neurological bridge to the past. Shamanic rituals are still carried out around the world in traditional religions, and nonshamanic people can experience similar feelings under hypnosis, or during fever, trance or migraine.

J.D. Lewis-Williams and T.A. Dowson (1988) in their article 'The Signs of All Times' propose a neurobridge backwards in time to the Upper Palaeolithic by which we can gain insight into the nature of the origins of art. Our nervous system has not changed much in the past 100,000 years. We are still physically very much the hunter-gatherers we were prior to agrarianism. In the signs of Upper Palaeolithic art Lewis-Williams and Dowson see entoptic phenomena very similar to those produced by people in altered states of consciousness today.

This is where we can already draw on the Bushman's sense-making

abilities and align it with global mythmaking cultures (the sacred, animated spirit world is as real as the secular, physical world; using trance dance for healing; exercising supernatural powers through dreams; rainmaking; visiting distant camps on out-of-body travel; the control of animals; to reinforce successful hunting expeditions, for personal and tribal protection, connection with the spirit world and the ancestors; to receive messages from and maintain a relationship with their gods; and to maintain a sense of structured, supportive community through a communal sense and myth-making).

"THE FORCE THAT THROUGH THE GREEN FUSE DRIVES THE FLOWER" -Dylan Thomas

One of the shamanic traditions that has been steeped in the use of hallucinogens to induce altered states of consciousness, for healing and divination, is that of the ayahuasceros – the medicine men and women, the mestizo shamans of the Amazon region. Ayahuasca derives from the Quechua language, huasca meaning "vine" and aya meaning "dead people." Thus the "vine of the dead" (Metzner, 1999).

With a growing body of research around altered states of consciousness, shamanic practice and therapeutic use of entheogens, DMT (short for the powerful psychoactive ingredient dimethyltryptamine of the ayahuasca brew) has drawn attention because of its reputation to induce special states of consciousness, during which the 'plant teachers' function as spiritual teachers and sources of healing power and knowledge. The plants represent a healing power or energy that can be associated with a plant, a person, an animal, even a place. "In the tribal societies where these plants and plant preparations are used, they are regarded as embodiments of conscious intelligent beings that only become visible in special states of consciousness, and that can function as spiritual teachers and sources of healing power and knowledge" (Metzner, 1999).

The ayahuasqueros or vegetalistas (plant specialists) see the material world and spirit world as interpenetrative – a realm were both co-exist, were "our normal waking consciousness, rational consciousness as we call it, is but one special type of consciousness, while all about it, parted from it by the filmiest of screens, there lie potential forms of consciousness entirely different" (James, 1901/ 1958, p. 228).

"Crucial to shamanic practices is the belief that many plants, if not all

plants, each have their own ‘mother’ or spirit. It is with the help of the spirits of some of these plants, which I have called ‘plant teachers’, that the shaman is able to acquire his powers” (Luna, 1984. p. 228)

The role of sacred plants in both ancient and contemporary societies are to allow the personal relationship with reality established in a mythical time; to develop relationships with an animal spiritual realm which is the source of power and self identification; the dissolution of death and ego and its resurrection and transformation; and social rituals to enhance social identity formation, group integration and cohesion and to reaffirm cultural values and beliefs (Winkelman, 1995).

Along with the intake of the ayahuasca brew, is the performance of the Icaros shamanic power songs learned either from a maestro shaman or directly from the spirits (Luna, 1984). They are used to communicate with the spirits of the natural world, to heal the sick, and to actually provoke certain kinds of visual displays or visions in those medicated with Ayahuasca. The most important of these songs are those learned from the spirits themselves or those received in the dream visions which often follow an ayahuasca session.

There are icaros for increasing or decreasing the strength of the hallucinations, for calling defenders or arhena, for curing specific illnesses, for reinforcing the effects of medicinal plants, for attracting the love of a woman (huarmi icaro), for calling the spirits of dead shamans, for causing rain, wind or thunder, for bewitching, for hunting or fishing certain animals, for curing snake bites, for protecting oneself before sexual intercourse, etc. One shaman even relates that if one knows the principal icaro of a shaman, you can attract his defenders when he dies, and can incorporate his knowledge (Luna, 1984).

Icaros are used only during ayahuasca sessions. In the highly sensitized state of ayahuasca intoxication, the icaros help structure the vision. They can also modify the hallucinations themselves. The icaros are the quintessence of shamanic power. Luna reports, “There are icaros for increasing or diminishing the intensity and color of the visions, for changing the color perceived, and for directing the emotional contents of the hallucinations.”

Vegetalistas are masters of synaesthesia. Through using the most interesting acoustic effects produced by whistling and singing, the geometric designs can be seen acoustically. The icaros refer to a medicine as “my painted song,” “my words with those designs,” or “my ringing pattern” and

relates to the entoptic phenomena described by Lewis-Williams and Dowson visible in the San Bushman rock art.

The authors explained the signs in Paleolithic cave art as entoptic images which arise within the human optic system, particularly when people are in altered states of consciousness. The authors compared entoptic-type images appearing in Palaeolithic cave art with similar ones in shamanistic rock art of the Coso Indians of California and the Southern San Bushman of South Africa to argue that Palaeolithic cave art was also associated with altered states of consciousness and was indeed a pan-human phenomenon.

Consciousness is contextual, a living biofeedback system, a cybernetic tool of existence, and therefore in the mind of the shaman and the magico-spiritual practitioner, can be manipulated through techniques of mind, by volitionally and wilfully 'bending', or alternating realities, and therefore consciousness.

Before embarking into the reality-manufacturing world of shaman, it would be useful to create a perspective to the different paradigms extant in the world of the magico-spiritual practitioner and consider a variety of approaches to magico-spiritual techniques (Frater UD, 1991).

Frater UD theorises that the typical present-day magician leans toward, alternates between, or aggregates aspects of the Spirit Model (used by shamans and traditional ceremonial magicians, in which autonomous entities exist in a dimension accessible to ours through altered states of consciousness); the Energy Model (where the world is viewed as being 'vitalised' by energy currents that the magician manipulates); the Psychological Model (in which the magician is seen as "a programmer of symbols and different states of consciousness," manipulating the individual and the deep layers of consciousness); and the Information Model (where information is the code that programs the essentially neutral energy of the life force), and ultimately evolves his own Meta-Model.

The Spirit Model, alongside the Energy Model is the oldest model of magic. We can find it worldwide in shamanic cultures as well as in many religions. Its basic premise is the existence of an otherworld inhabited by more or less autonomous entities such as spirits, angels, demons, gods, etc.

The shaman or magician is someone who can enter this otherworld at will, who has travelled widely in it, knows its language and customs and has made friends, smitten enemies and/or acquired allies and servitors there. This is

important as all magic is of these entities' making. The modern German word for witch, "Hexe" (f.) illustrates this rather neatly if we take a closer look at its etymology. It derives from Old High German "hagazussa" which translates as "fence rider". The hagazussa is riding the "fence between the worlds" i.e. she is at home in the world of everyday life as well as in the magical otherworld of spirits.

These entities who are usually invisible, at least to the average person, and it is the shaman's or magician's task to make them put his will into effect. This may be done by prayer, by barter, by cajoling or even vide medieval demon magic by the application of magical force, threats and pressure.

The otherworld may have its own geography but it is usually considered to coexist with the world of everyday life. The key to entering it is an altered state of consciousness, controlled trance or ecstasy of which the shaman is an expert.

The Energy Model is based on the ancient healing disciplines of hypnosis and magnetism. "Animal magnetism" is a subtle force inherent in organisms. Interesting parallels to this concept in the vitalist theories of biology, Prana from Yoga, the Polynesian concept of Mana and the Chinese principle of Ki or Ch'i (Chi). In early shamanic cultures, shamanic magic is very frequently a mixture between the spirit and energy model, e.g. the shaman may call upon his spirits or gods to give him "power" or he may, vice versa, use his power to extort favours from them.

In its pure form, however, the shaman or magician is not in need of spirits and other entities. The world is viewed as being "vitalised" by subtle forces or energies and his primary task consists in mastering the art of perceiving and manipulating them. As all phenomena are basically energetic in nature, the existence of an otherworld is not strictly required. Thus, the magician is more of an "energy dancer" than a "fence rider" or go-between. But even here the key to the perception, charging and general utilisation of these forces is again the magical trance or, in magical terms, gnosis.

This approach was popularised in the West since the seventies when the general influx of Eastern thinking made concepts such as chakra and kundalini work a mainstay of most occult disciplines.

With Sigmund Freud's theory of the subconscious, man was suddenly seen as a being which was only partially conscious and in control of itself. The Psychological Model's premise is that the subconscious (or, as Carl Jung

later retagged it, the unconscious) will do the job if it is properly addressed and/or conditioned. This is achieved by magical trance, suggestion and the use of symbols (i.e. selective sensory input) as tools of association and as a means of communication between the magician's conscious will and his subconscious faculty responsible for putting it into effect.

A more radical approach was taken by Austin Osman Spare whose sigil magic rests on the basic tenets of the psychological model. Spare's brilliant system is in principle an inversion of Freud's theory of complexes. The psychological magician is a programmer of symbols and different states of consciousness. He is not necessarily in need of a transcendent otherworld or even subtle energies, though in practice he will usually work on the assumption that one or the other (or both) do in fact exist and can be utilised by his subconscious. By actively suppressing his will in the form of a graphical sigil and forgetting it, the magician creates an artificial "complex" which then starts to work on similar lines just as suppressed, subconscious traumas will cause neurotic behaviour, etc.

The Information Model of magic is a more recent development. Its basic premises are that, a) Energy as such is "dumb", it needs information on what to do; this can be so called laws of nature or direct commands; and b) Information does not have mass or energy. Thus, it is faster than light and not bound by the restrictions of the Einsteinian space-time continuum. It can therefore be transmitted or tapped at all times and at all places, via a kind of 'information matrix'.

The application of the, as yet evolving, information model has led to the discipline of Cybermagic (from "cybernetics" or the "science of control systems"). Contrary to the other models described above, Cybermagic does not rely on magical trance to achieve its effects. Rather, the Cybershaman activates either his own main memory banks, namely brain and spine, or those of the target person. His techniques demand controlling kundalini effects through Yoga and meditation.

The Meta-model of magic is not a model as such but rather an instruction on the use of the others. In the spirit model healing is regarded as an exorcism, illness is caused by "evil" or, at least, undesired entities which have to be neutralized and removed by the shaman or magician. To achieve this the shaman will usually call upon the help of his own spirits who will then handle the matter.

Properly exorcised, the patient has been freed from the cause of his ailment and can recuperate. In the energy model ailments are seen to be caused by energetic imbalance. The magician's task consists of restoring that balance of energies commonly defined as "health". This he may do by laying on hands, by using crystals and precious stones, by magnetism or chakra massage, etc. The balance having been restored, the patient is regarded as having been healed.

In the psychological model illness is considered to be basically psychosomatic in nature. The magician will, therefore, either do a ritual work with the patient which enhances his stamina and resolves his troubles (e.g. a Saturn ritual to cope with "Saturnian challenges" the patient is seen to have avoided by becoming ill) or he will charge a sigil for the patient's health.

In the information model the Cybermagician will transmit an informational "healing matrix" into the patient's system (or somehow create a "morphic field" of health and self-healing) and let the patient's energies take it from there to do the job of their own accord i.e. automatically. Following the meta-model the magician will decide beforehand in which paradigm he will begin his operation. This must not necessarily exclude the possibility of shifting the paradigms in midwork or of blending them, of course. In contrast to standard psychotherapeutic care (such as psychoanalysis attempting to bring repressed materials to the surface so that they can dissipate), the cybermagician, seeking psychointegration, might mine his own repressions and obsessions for energy to empower creations of his own imagination, a goal that many psychiatrists might regard as being quite contrary to mental health.

THE UNIVERSALITY OF ALTERNATE STATES OF CONSCIOUSNESS

Shamanism, then, represents a series of individual performances in a dynamic complex across space and time, a going beyond (Luna and White, 2000). A key aspect of shamanism from 'both worlds', from the landscapes of the Southern African San Bushman and the Amazonian ayahuascero, is that it is a way which embraces a deep relationship with nature.

Eastern techniques embrace the shamanistic approach, particularly Tantric methods of the lefthand path (such as the way of the aghora), which includes

meditating at funeral pyres at the ghats, in graveyards and at a variety of Himalayan pilgrimage spots. In the broadest sense shamanism is the natural science of the subjective condition, a position it shares with Gnosticism an extended awareness of oneself in the existential flow. It is humanity's search for self transcendence.

Achieving altered states can take place during meditation, hyperventilation, the practice of yoga, hypnosis, fasting, and physical suffering (such as the self-inflicted pain in certain religious traditions or by modern-day body-alchemists). It is a state that can be reached in many ways to explore aspects of reality different from those perceived in an ordinary state of consciousness (Polivoy). "Many cultures have developed technologies for altering consciousness and inducing spiritual experiences.". Describing shamanism and its ancient healing practices within the context of neurotheology, he has demonstrated that there are basic similarities in shamans in cultures around the world. The similarities in shamans include the use of trance or ecstasy altered states of consciousness (ASC) to interact with the spirits and heal. These spirit world interactions are often referred to as "soul journeys," flying, out-of-body experiences and astral projection. These abilities are acquired when the initiate shaman undergoes a "death and rebirth experience" and acquires animal allies and spirit powers.

Winkelman outlines the neurobiological basis of shamanism—humanity's original spiritual practices, and explains puzzling aspects of shamanism, its universal presence in the ancient world, as well as its modern resurgence. "Universals of shamanism are related to basic brain functions. The shamans' experiences and practices have fundamental similarities around the world because they reflect innate brain process and experiences" (Winkelman, 2000).

Winkelman's research findings place shamanism in the context of human evolution and suggests that shamanic practices were a key element of the evolution of modern humans some 40 000 years ago. Shamans helped people acquire information and develop new forms of thinking. Shamanism also provided mechanisms for healing and personal development, building alliances and creating group solidarity.

"Shamanism is not just an ancient practice nor is it limited to simpler societies. The contemporary world has many examples of 'neoshamanism,' current adaptations to these ancient principles of spiritual healing and

consciousness" (Winkelman, 2000).

The shaman knows that the psychedelic experience, the altered state is programmable whilst his frame of mind and the surrounding mise-en-scène contributes substantially to the experience and demonstrates the enormous role that both culture and the psyche play in shaping the experience. (Davis, 2000).

THE MAKING OF MEANING AND MYTH – THE MANUFACTURING OF REALITY

For the shaman the experience of ASC is as if the anchors of his mind are set free and consciousness is set adrift (unbound) needing to find new bearings and coordinateness, improvising, and forcing alternate reality constructs as he goes along.

In this sense shamanic art (reference the San Bushmen rock art and ayahuasca visions) become representational of the inner worlds and visions of the practitioner. They are 'probes' sent out into the real world to represent and align with the inner world of the ancient shaman and modern psychonaut. It becomes subjective layering of alternate realities and an extension of the inner world of the shamanic seer/ seeker of meaning.

These probes can be viewed as mind-trajectories from liminal into boundless space – an attempt to incorporate (integrate) and reach out into unbound space from the 'bound space-time' of the skin-clad body (leading to the experience of embodied and disembodied space-time) ... beyond the boundaries of skin, beyond the contours of the normal consciousness of the shaman.

STEPS TO A SHAMANIC EXPERIENCE (FROM THE ARCHAIC TO THE MODERN) – THE STAGES OF THE SHAMANIC JOURNEY

Common to all shamanic or magico-spiritual experiences is that some degree of alteration of consciousness is necessary (Harner, 1990. p. 49). The following steps illustrate the common boundarybreaking steps that earmark any shamanic or magico-spiritual, altered, ecstatic or trance-state experience, and can be summarised as follows,

-Inducing ecstatic or altered states of consciousness (through trance states or the ingestion of entheogens; usually accompanied by the inner or outward declaration of wilful intent and possibly cultural context through ritual);

-Various stages indicating the commencement of the journey (visual effects – entoptics; physical symptoms; signs of allies and familiars, etc. as the ASC gains momentum);

-Dissolution of boundaries of self and normal perception of reality (usually associated with the releasing 'little death' experience which can be incremental or sudden) – into the void;

-Achieving an altered state of consciousness (reality shift into boundaryless space; sense of connection to everything a sense of individual existence, of separateness from the physical world around him, evaporates – the so-called 'ocean of consciousness' experience) – in the void; and

. The return to the normal mundane realm and existence associated with psychointegration and re-membering of imagery and 'messages – through the void.

In essence, for the shaman, the magico-spiritual experience honours and/or recognises the interpenetrative spirit of the body and the body as product of the landscape at the same time. The body, the vehicle for our minds and consciousness, is a product of its environment, and needs to engage with it continuously, through all states of consciousness for its survival. Consciousness is a

by-product of this interaction. The limitation of consciousness, altered or alternative is the degree to which it can consciously process this reality on its own terms, and in terms of its environment, communal, spiritual, physical or otherwise.

It would be more accurate to talk about states of consciousness per se, than trying to carve up or layer these states of consciousness, which is an arbitrary act in its own right. Awareness is like a torchlight beaming out onto the landscape of being and becoming. These states of consciousness are all intensities of the same torchlight, not altered versions or aspects of it.

What is of more interest from a magico-spiritual perspective is, if alternate realities truly exist alternate realities of which we can become consciously aware and engage with (the true aspiration and domain of the ancient shamans and modern psychonauts). The continuous attempts to penetrate these alternative or other realities are the same quest for the shaman, the scientist and the magicospiritual practitioner.

Modern shamans have adopted some of these techniques to project into other, altered or 'all potential' states of consciousness, to explore the contours

of their minds and discover 'the pattern that connects' (Bateson, 1995).

All minds are landscapes to be traversed and explored by a multiplicity of techniques and approaches. An archaeology of mind is available to us and an ecology of consciousness can be evolved from these recorded experiences and related research.

ON VARIETIES OF CONSCIOUSNESS

Consciousness cannot be bound it is boundless. Like ancient three masted ships safely hugging familiar coastlines, we are traversing inner space bound by skin and boundless outer space enveloped in space-time – we are embodied consciousness. For the journey is still not complete we are still refining our tools of investigation and exploration. The journey for mankind has just begun. The need to look within and without (with feeling, with meaning, without boundaries – spiritually, scientifically or otherwise).

We have to enter a magical realm where we can re-imagine ourselves being and becoming ad infinitum – a progression upwards and downwards on the snakes and ladders of existence. From a shamanic perspective we are still evolving in every direction – into and out of extinction (genetically and memetically). Thoughts, like clouds, rising, drifting and vanishing – such is our lives – like the fleeting swallow of reality flying in from the cold, through our hall of consciousness and back into the cold night again (from the tale of the Venerable Bede quoted by Weinberg, 1993. p. 208-209).

The first step is to discover what lies within. This is still our chief pre-occupation. To bind things, thoughts. The problem is that what we imagine can be bound, is boundless. All states of reality and consciousness shift – it is a pesky little thing that cannot be pinned down, especially not in our quantum universe stalked by Schrödinger's, or was it the Cheshire cat?

One moment you are selling your audience Coke consciousness and the next body comes along and sells Pepsi consciousness. From this point onwards things get blurry and indefinable on both terms, unless you elect to experience interpenetrative Coke-Pepsi consciousness in which neither is distinct nor has a separate identity (reality) any more – simultaneously a gain and a loss.

The point of course is to go for neither and remain in a boundaryless state of flux – in a state of so-called Buddha, boundless or non-dual mind – where you can literally think yourself up and down the evolutionary ladder. You can

imagine (manufacture/imagineer) what you were before or states of being yet to come … witness the unfolding mystery of all mysteries, the 'source of all things' of the Tao te Ching.

What you can imagine you can become. It is all quite simple from here onwards. And you can realise it in this lifetime. Leave it up to the quanta and the life force and from this rich soup you can serve up anything you like. Today you can witness this instance in space-time around you. Everybody and everything is in different states of being and becoming … you have this multicameral mind taking snapshots of emerging realities in space and time.

From this point onwards it all becomes trajectories. Bound in our bodies, we become trajectories of mind into boundless space and time. We are the hunters … bound in our skins we hunt space-time which is boundaryless – without beginning or end. Add some quantum flux and you can have infinite possibilities (infinite potential), universes, consciousnesses, realities …

"We regularly experience our skin as the boundary of our body. Our identity is in part formed from our understanding that we are bounded creatures. One way we understand our self is that we are defined by the body we inhabit—we are bounded objects, contained within our skin" (Rohr, 1995).

Similar to the "Osmose (1995) experience an immersive interactive virtual-realty world created by Char Davies these inner and outer landscapes are 'spaces for exploring the perceptual interplay between self and world, i.e. a place for facilitating awareness of one's own self as consciousness embodied in enveloping space'.

It is the artist's 'belief that traditional interface boundaries between machine and human can be transcended (in the case of Osmose) even while re-affirming our corporeality, and that Cartesian notions of space as well as illustrative realism can effectively be replaced by more evocative alternatives' has a very shamanic ring to it. For her 'Immersive virtual space, when stripped of its conventions, can provide an intriguing spatio-temporal context in which to explore the self's subjective experience of "being-in-the-world" as embodied consciousness in an enveloping space where boundaries between inner/outer, and mind/body dissolve' represents a very altered state of consciousness.

Parallel consciousness takes on another dimension for physicist Fred Alan Wolf (1991) altering the way in which we see reality alters reality. Existence

as we know it is a subset of reality which is unknowable. Our minds are tuneable to these multiple dimensions, multiple realities.

EM-BODI-MENT (MIND/BODY ALCHEMY)

Manufacturing reality is about binding consciousness in space-time – enveloping it with skin. We are embodied consciousness … that can imagine dis-incarnate bodies, experiences that are unbound – unbound by our reality. Within that manufactured reality we cloak, we dress, we provide skin, we tag and attempt to define. It is what we were designed to do – it is consciousness by design, manufactured reality.

The latest neuropsychological research has demonstrated that regardless of culture, space, time, shaman, cave, priest, temple, magician or psychonaut – you are stuck with an apparatus that is bound in skin, chased with memes, seeking out new trajectories into space-time/reality – imagining reality unbound (a space in which consciousness as we know it does not exist).

But we can dream it … in the little labs between our ears we can excite potential and past states of being, and project trajectories to the future, into nether realms of reality. Especially in excitatory states, the timelines cross over and new states (modalities) of consciousness can be imagined and engineered (imagineered), manufactured and projected into space-time (our space-time).

That is why the experimentation and exploration can never stop – the experiment, the experience that is us, cannot stop (even though we are only facets (fractions) of reality and can only realise so much of what we are made of in one lifetime … a sea of potentiality, reality, self, consciousness, awareness bound in skin.

Can there be one consciousness, bound and unbound, inside and outside of skin at the same time? We'll leave that to you to decide and speculate upon. But for all of us we predict the journeying has just begun. The exploration has just commenced … when science embraces techniques of consciousness in the same way that modern technoshamans have embraced all possible realities, bound and unbound, at a stage when consciousness is still formulating and revealing itself to our biocomputers.

We are still in for a real treat of cosmic proportions. The first step towards integrating these 'opposing' realities is to take a holistic view of the universe – to take a step back as the mystics did with hermetic statements of 'as above,

so below' and 'solve et coagulum' – you have to dissolve in the one realm of consciousness (lose your skin so to speak) to emerge in the next dimension of reality – to move from bound to unbound to bound again.

To gnostically, hedonistically and ecstatically engage with reality head on and discern as you go along – the path of science – and to dismiss the whole.

Things we 'know' about consciousness from a magico-spiritual perspective,

i) The mind is telescopic.

ii) Consciousness is the product of bound, liminal space-time. iii)Consciousness is evoked potential.

iv) Consciousness is personalised, embodied reality.

v) The landscape of mind describes the boundaries of consciousness. vi) Consciousness is the brain's attempt at sense-making.

vii) Consciousness as 'having a point of reference', a rootedness in reality.

Where most people are quite content to occupy 'dead centre' of the landscape of their lives and experiences, to live in so-called 'balance', the shaman seeks out the liminal spaces the zone that lies not-quite-one-side and not-quite-the-other-side of such conceptual boundaries. Inside liminal space ritual, and its 'product', altered states of consciousness, becomes the metaphor for proceeding from the known to the unknown, from the bound to the boundless. Employed within bound space, it disconnects its participants from everyday existence (Connerton, 1989. p.4). The actors have entered a "liminal" or "threshold" state. Both metaphor and ritual are ways of recognition in which the identifying qualities of one thing are transferred in an instantaneous, almost unconscious, flash of insight to some other thing that is, by remoteness or complexity, unknown to us. 'In this gap between ordered worlds, almost anything may happen' (Turner, 1974. p. 13).

On the "…concept of 'ecology of mind,' which states that mind is immanent in systems and not isolated to individual locations", Bateson concluded that the individual mind is immanent, but not only in the body. It is immanent also in pathways and messages outside the body; and there is a larger mind of which the individual mind is only a sub-system. This larger mind is comparable to God and is perhaps what some people mean by God, but it is still immanent in the total interconnected social systems and planetary ecology (Bateson, 1978).

THE FARTHER REACHES OF CONSCIOUSNESS – TO INFINITY AND BEYOND

The farther reaches of the conscious and unconscious mindscapes are being increasingly scientifically and experimentally explored through a variety of psycho deconstructive and integrative techniques – from the shamanistic 'manufacturing of reality' by deconstructing boundaries of sensemaking reality, to the reality and consciousness-making of artificial intelligence, studies into animal and plant sentience, and psychonautic explorations into other 'dimensions' of reality and consciousness constructs. It is a netherworld, a 'twilight zone', of either or neither that has attracted, and been navigated by generations of psycho-spiritual seekers and mind explorers in the form of artists, poets, philosophers and the modern-day high priests of science and cyber shamans.

MAGICO-SPIRITUAL TECHNIQUES – PROGRAMMES OF THE MIND

A variety of traditional and modern magico-spiritual techniques centering on achieving altered states of consciousness have evolved to project will and intent towards specific outcomes either for personal development, therapeutic applications or for mundane, personal use. These practices have evolved into 'cyber shamanism and psychonautics' through a variety of ecstatic techniques such as gnosis, breathing, meditation, visualisation, and the use of psycho-integratives (entheogens such as ibogaine, San Pedro and ayahuasca), tantric practices and ritual.

The main aim of developing and refining magico-spiritual technique over the ages is to achieve altered states of consciousness repeatedly and reliably – an intentional manufacturing of reality through meta-sense and mythmaking.

Magicians are interested in the utilisation of techniques to bring about a state of gnosis/trance or no mind to create a magickal outcome in either themselves or the world around them. Primarily this kind of gnosis falls into what Peter J. Carroll (1987) calls an excitatory mode of gnosis. 'Inhibitory' or 'releasing' techniques are utilised as a means to strengthen alternate senses that are being excited or stimulated. By mastering various techniques, and through experience, a magician can apply these techniques to effect with safety and reliability.

These techniques include the ability to explore and face all aspects of

reality, good or bad, painful or pleasurable, to the point of going to extremes, is the illumination that magicians seek to allow their mind's to become conscious of the fact that these feelings and emotions are only constructs of the mind.

From a shamanistic perspective, "The shaman is a technician of consciousness who utilises those (psychobiological) potentials for healing and for personal and social transformations" (Winkelman, 2000).

FUTURE PSYCHONAUTICS; ALTERNATE STATES OF CONSCIOUSNESS; INTEGRATED, HYPER CONTEXTUAL CONSCIOUSNESS

In the introduction to I Hope I Shall Arrive Soon, a collection of late short stories, Dick (Sutin, 1995) wrote that "we live in a society in which spurious realities are manufactured by the media, by governments, by big corporations, by religious groups, political groups—and the electronic hardware exists by which to deliver these pseudo-worlds right into the heads of the reader, the viewer, the listener" (Sutin, 1995).

MANUFACTURING REALITY

"Altered states of consciousness are real, and as our media technologies get better at drawing us in and out of them, artists and other non-coercive proponents of the human spirit (or whatever you want to call it) need to become familiar with these states, not simply as a source of inspiration, but as modes of expression, communication, and confrontation itself. By recognizing that the material that we are now focused on is not technology but human experience itself, then we take a step closer to that strange plateau where our inner lives unfold into an almost collective surface of shared sensation and reframed perception — a surface on which we may feel exposed and vulnerable, but beginning to awake." --Erik Davis, Experience Design, And the Design of Experience

MEANING/SENSE-MAKING

It is through meaning, rather than belief, that we are able to transform reality at any level, because meaning changes from moment to moment. Since the discovery of meaning is spontaneous, magico-spiritual work is a collection of discoveries. The psychonaut is interested solely in the green

edge of consciousness.

Clearly, the object of magic is to achieve higher states of consciousness. The magus is empowered to affect events only to the extent that he is able to recognise that inside and outside is one. To transform the world is to transform oneself and vice-versa. However, although those who don't know what they are doing are obliged to perform magic strictly through the observation of rituals, those who understand its real nature and purpose can move directly to its centre and act from there, without incantations and conjurations.

INTERPENETRATIVE SPIRIT (ACTION)

The sciences need to plumb the depths of 'primordial reality', the 'first reality', the so-called pre-rational, and seek out the heights of the post-rational realm, super conscious (the borders of which make science shrink back suspiciously with statements of 'metaphysical' or 'mystical'), to discern and navigate the contours of human consciousness. Only then can we prepare for the transhuman aeon of transcending the boundaries of human consciousness that will follow.

STEPS TOWARDS A FURTHER ECOLOGY OF MIND TRANSLATIVE, TRANSFORMATIONAL, TRANSCENDENTAL, TRANSHUMAN

The following 'progressive stages' will form a framework for future research into a 'steps towards a further ecology of the mind' (to borrow from Bateson),

a) Translative consciousness – Newtonian step and repeat thinking; linear; measured consciousness; clear boundaries between subjective and objectives; still evolving; penetrative but not whole-picture awareness; bound, demarcated consciousness.

b) Transformational consciousness – metamemes; conscious metaprogrammes (e.g. John Lilly's papers on dolphin research). The self-organising principles of complexity theory.

c) Transcendental consciousness– e.g. tantra, all layers, all dimensions, simultaneously; ocean of consciousness experience (but with complete awareness and sentience – not a psychedelic, Gnostic or ecstatic, trippy joyride; beyond life and death; connectedness – inwardly and outwardly) –

the true interpenetrative spirit and possibly the final frontier of human, three-dimensional space-time consciousness. Unbound, fuzzy consciousness. Highest level of complexity and complexification.

d) Transhuman consciousness – boundless multidimensional space-time. Chaotic random sea of possibilities, probability and potentiality. The pregnant void. The so-called 'mother' principle of the Tao. Creative/destructive spirit. Glimpses from the magic-spiritual realm; the perspective of the shaman. Emergent transition to consciousness without bounds, immeasurable …the apeiron.

CONCLUSION

The consciousness that we experience is human consciousness. It is not the totality of consciousness 'out there', the totality of consciousness that still has to be experienced or must still be re-membered.

Consciousness is an excitatory state – a gateway of the mind e.g. meditation calms one part of the mind which allows a subliminal excitatory state to 'emerge' of which you become aware. It (realisation, awareness) appears magically (rises up into conscious awareness) as if hidden, from nowhere, therefore the mystical analogies that get contributed to Gnostic and ecstatic states of consciousness. The brain is a fixed state (bound) organic material that has captured or was formed by these excitatory states – interpenetrating the body from boundless reality.

We are the product of this interpenetrative spirit the apeiron (a boundless excitatory state of potentiality of interpenetrative matter and spirit).

30. Consciousness, And Mystical, Spiritual And Religious Experience

by Raymond F. Paloutzian, Thomas G. Fikes, & Dirk Hutsebaut
Dept. of Psychology, Westmont College, Santa Barbara,California. Editor of The International Journal for the Psychology of Religion.
Dept. of Psychology, Westmont College, Santa Barbara, California.
Faculty of Psychology, Katholieke Universiteit Leuven, Belgium.

Abstract. This chapter presents an interpretation of religious experiences, including but not limited to those that are triggered by or associated with known brain processes, that is based on attribution principles from social psychology. Psychological research on both common and unusual religious experience, and a social cognition orientation in general, points to the human tendency to attribute meaning to events and perceive wholes where there are parts. This raises the question of whether various mystical experiences and similar states of consciousness, coupled with the different ways that people talk about them, share a common core that is fundamentally the same but described in different languages, or whether they are in fact fundamentally different at a neurobiological level.

Also at issue is whether the heightened sense of awe, the numinous, or the perception of God reflects something that is "actually there" (and if so, what its character is) or whether it is "merely psychological," and how each conclusion is reached. The interpretation of neurobiologically based experiences by a person depends on the schemas brought to the perceptual task in a social context, and their meanings reflect the attributions made.

PSYCHOLOGICAL QUESTIONS ABOUT EXPERIENCES OF GOD

The notion of neurotheology raises the idea that it is possible to learn about God or God perceptions by studying the brain. Specifically, the narrowest version of this idea, mapping the brain mechanisms that underlay

reports of God experiences, is said to tell us about the neurobiological substrates of experiencing God. We argue that the efforts to map such brain mechanisms may teach us a great deal about the neuropsychological processes that are at the basis of various important perceptions – such as the perception of God, the numinous, and Absolute Unitary Being (d'Aquili & Newberg, 1993, 1999) – but that such knowledge does not tell us about God. By virtue of this, the "neuro" can at best touch only a small corner of "theology." Instead, knowledge of this type can be correctly understood only within the social context in which a person reports to have had certain experiences. This means that the most appropriate level of analysis for understanding the processes that lead to God perceptions is social psychological, not neurobiological or theological. These latter fields are not irrelevant, but simply do not constitute the sole (or even best) level of analysis for the phenomena of spiritual experience. In fact, all experiences of this type are attributions to supernatural agency (for God perceptions or religious apparitions) or to some other non-ordinary agency (for non-God spiritual or mystical experiences) for the cause of a particular ambiguous experience, stimulus, or stimulus complex.

Let us explain the rationale for this analysis by first looking at exemplars of God experiences and of equally potent non-God mystical or Awe experiences. A social cognition view suggests that the basic psychological process of attributing meaning to the experience is the same in all cases. Examples of both types appear in both a classic century-old text in the psychology of religion and in recent books and articles in neurotheology.

God or Awe Experiences in Classic Psychology of Religion Literature

James (1902) published the following two descriptions of vivid experiences. They are exact transcriptions of what the people who had them said and felt, in their own words. One report is of a God experience and one is not.

God Perception. "These highest experiences that I have had of God's presence have been rare and brief—flashes of consciousness which have compelled me to exclaim with surprise—God is here!—or conditions of exaltation and insight, less intense, and only gradually passing away. I have severely questioned the worth of these moments. To no soul have I named them, lest I should be test, they stand out to-day as the most real experiences

of my life, and experiences which have explained and justified and unified all past experiences and all past growth" (James, 1902/1958, p. 305).

Non-God Spiritual Presence. After being awakened one night, one man said, "I then turned...to go to sleep again, and immediately felt a consciousness of a presence in the room, and singular to state, it was not the consciousness of a live person, but of a spiritual presence...I do not know how to better describe my sensations than by simply stating that I felt a consciousness of a spiritual presence...I felt...a strong feeling of superstitious dread, as if something strange and fearful were about to happen" (James, 1902/1958, p. 64).

God or Awe Experiences in Neurotheology Literature

Examples of purported experiences of God or of equivalent non-God experiences of Awe are described in recent neurotheology work by Newberg (Newberg, d'Aquili, & Rause, 2001; Newberg et al., 2000, 2001). Examples of non-God, spiritual-presence experiences appear in Persinger's work involving haunt phenomena (Persinger & Koren, 2001) and sensed presence (Cook & Persinger, 2001; see also Persinger, 1993).

Newberg Data. Newberg, d'Aquili, and Rause (2001) describe two intriguing cases of brain activity correlated with intense mystical states. One of these involves visually oriented meditation in Tibetan Buddhists who experience "ultimate reality" or Absolute Unitary Being (Newberg, Alavi, Baime, Pourdehnad, Santanna, & d'Aquili, 2001). The second one involves the experience of God's presence by Franciscan nuns during centering prayer ("a 'verbal' based meditation involving the internal repetition of a particular phrase"; Newberg, Alavi, Baime, & Pourdehnad, 2000, abstract) (Newberg, d'Aquili, & Rause, 2001). In both cases, the brain events and phenomenological reports are similar and are readily interpretable within d'Aquili & Newberg's (1993) elaborate neuropsycho logical model. The Buddhist meditators report feelings of a loss of sense of self, of oneness with the universe, of timelessness and infinity, of a peak spiritual moment, and of the absorption of the self into something larger. Similarly, but in the language and context of a theistic religion, the Nuns report "a tangible sense of the closeness of God and a mingling with Him" (Newberg, d'Aquili, & Rause, 2001, pp. 2, 7, also chapter 6). Thus, the attributions made about these raw phenomenological experiences are somewhat different and reflect differing

theological views.

Methodologically, the studies are relatively straightforward. In each case, the subject began to meditate, and as he or she approached the peak, the subject indicated this to the experimenters in an unobtrusive way (e.g., a tug on a piece of twine). The experimenters, in an adjacent room, injected a radioactive tracer into the subject by means of catheter, waited for 20-30 minutes, and placed the subject beneath a SPECT (Single Positron Emission Computerized Tomography, a noninvasive functional brain imaging technique) camera. The resulting three-dimensional image yielded a picture of the brain's activity during the meditative climax. The image obtained during the meditative climax was compared to the same subject's brain image during baseline activity.

The results of the brain scans indicate a number of similarities among the subjects in both the Buddhist and Nun groups. These include an increase in dorsal lateral prefrontal activity that corresponds to a state of intense, sustained attention in the model, and a decrease in posterior superior parietal activity (particularly in the left hemisphere) that corresponds to a "functional deafferentation" of the regions responsible for distinguishing self and non-self in the model. Differences between the groups emerge, however, in how they interpret their subjective experiences. For the Buddhist meditators, the sensations are attributed to a state of what Newberg refers to as "Absolute Unitary Being," a becoming one with the universe and a loss of self (see Newberg, d'Aquili, & Rause, 2001, p. 120). For the Christian nuns in prayer, the experience is of the presence of a personal God and a union with Christ.

Persinger Data. Persinger's research, extending from the early 1970s to present, has suggested that relatively low intensity magnetic fields may induce mystical or numinous experiences. These magnetic fields may be artificially produced in a laboratory using a technique called transcranial magnetic stimulation (TMS), or they may be naturally occurring, ambient fields due to geomagnetic or electromagnetic factors. Moreover, he reports that persons with high "temporal lobe lability" (temporal lobe epileptics exhibiting complex partial seizures, or persons scoring high on scales that discriminate such epileptics) show increased susceptibility to these weak magnetic field disturbances,particularly when the fields oscillate in ways that mimic endogenous EEG activity of temporal lobe structures.

A study by Cook and Persinger (2001) on sensed presence is

representative of Persinger's laboratory research using TMS. This technique, which induces an electrical current in the brain by applying a time-varying magnetic field above the scalp, is a recent development that has been investigated in a small number of clinical (e.g., depression) and basic research applications (Fitzgerald, Brown, & Daskalakis, 2002). Typically, magnetic fields of 1-2 Tessla (T = a measure of magnetic field strength) are required for an effect. In Persinger's research, however, very weak fields in the 1 μT range are employed (slightly greater than ambient fields; see below). These fields are modulated in time, and are applied over specific regions of the scalp.

Persinger and Cook (2001) tested Persinger's (1993) vectorial hemisphericity model by applying TMS either bilaterally or unilaterally to the right hemisphere with subjects who had given high or low scores on a test of "complex partial epileptic-like experiences" (Persinger & Makarec, 1993). Subjects were recruited to participate in a relaxation study, and following 20 minutes of TMS were given a 20-item questionnaire that included, as one of the response items, "I experience a presence." They found that subjects with low temporal lobe lability reported no experience of sensed presence, whereas subjects with high temporal lobe lability reported significantly more. Consonant with the model, significantly more sensed presence reports were given under right TMS (75% of subjects reporting a sensed presence) than bilateral TMS (60%). No significant differences between the groups or conditions were found for control items referring to tingling sensations, dissociations, or fear. According to the model, these sensed presence reports are due to "awareness of the right hemispheric homologue of the sense of self" (Persinger & Cook, 2001, p. 447).

A second study from Persinger's group illustrates his research involving ambient magnetic fields, including geomagnetic fields (GMF) and electromagnetic fields (EMF). These fields are even weaker than those Persinger uses in the TMS studies. Normal levels for the time varying components of these fields are reported to be in the 10-100 nT range for GMF and 100-500 nT range for EMF.

Persinger and Koren (2001) report a 1996 case of a 17 year old woman concerned about haunt experiences in her home. Specifically, she complained about visions, vibration of the bed, footsteps and humming, and a visitation by a spirit – a sensed presence felt beside her bed and then in her body.

The onset of her haunt experiences coincided with GMF fluctuations exceeding 50 nT. EMF monitoring in the teenager's bedroom showed an unusually high level (4 μT) and was traced to an electric clock at the head of the bed. She had apparently sustained trauma to the left prefrontal region as a young child, and still showed motor deficits on her right side. Because Persinger's earlier work (e.g.,

Persinger & Richards, 1995) had suggested that GMF activity exceeding 20 nT accompanied by transcerebral magnetic fields were correlated with reports of a sensed presence, and because she was presumably at risk for epileptic brain activity, they concluded that these factors were likely the precipitating events in the present case, as well. The woman's negative subjective experiences stopped when she began sleeping in another room (with ambient magnetic fields less than 100 nT), and the family's fears of psychotic disturbance were put to rest.

Persinger and Koren's explanation involves three elements: (a) a stimulating event that has no clear referent (EMF or GMF fields), (b) stimulated brain regions that generate various sensations and feelings (the temporal limbic areas are prime candidates), and (c) an attribution process that "makes sense" out of these psychological states within a cultural or religious context. What it doesn't have room for is any sort of ontologically valid spiritual presence as a referent. As they see it, there is "not a single case of haunt phenomena whose major characteristics cannot be accommodated by understanding the natural forces generated by the earth, the areas of the human brain stimulated by these energies, and the interpretation of these forces by normal psychological processes" (Persinger & Koren, 2001, p. 179). We argue that although the issue of an ontologically valid spiritual presence being involved in such experiences is in principle neutral and independent of a scientific account, normal psychological processes certainly are involved, so much so as to make highly suspect Persinger's own claims to have found a brain mechanism unique to God awareness. Because his subjects are often aware that they might have such experiences, the long-known process of expectation based on preparatory mental set is sufficient to account for Persinger's findings.

SOCIAL PSYCHOLOGY OF AWESOME AND GOD EXPERIENCES

Questions Raised By These Samples Of Experiences:

Situation-Disposition Interaction. In order to understand how people who purport to have seen God or who had a nonreligious but Awesome or spiritual experience (whether "naturally" as in the case of James' subjects, or in a research context as in the case of the neurotheological studies) came to recognize what it was that they were seeing, a number of crucial psychological issues must be addressed. For example, although it is assumed that all of these perceptions are mediated through brain processes, it is still necessary to understand what psychological mechanisms work to make these experiences happen. A percept is a psychological phenomenon, not merely an biochemical event. This means that it is at a psychological level of analysis that it must be understood. The social psychological approach has as one of its strengths the principle that personal and contextual factors interact in order to produce effects. Applied to the problem of how to understand the unusual experiences of concern in this chapter, this implies that a particular neurobiological event is interpreted a certain way because of two interacting factors. One of them is dispositional — some aspect of the person such as a schema or a motivational tendency, and the other one is situational — aspects of the social environment in which this person lives, moves, and is confronting the stimuli in question.

Attribution of Meaning. Do these experiences share a common core that makes them fundamentally the same, only perceived or stated differently by the persons? The common core thesis is the notion that such experiences are essentially the same at the neurobiological level and that they are reported differently, in different languages (e.g., God language and non-God language) because the person's schemas, language, and social context drive the perceptual task (Hood, 1995). So far we have no evidence of religiously unique brain processes, as if what is occurring in the brain of a Baptist who claims to have seen God is any different from what is occurring in the brain of a Catholic who claims to have seen God. No evidence is reported by Newberg or by Persinger of brain mechanisms unique to specific God or Awe experiences.

How then are we to account for the differences in perception between God and non-God perceptions, if they are not due to unique differences in neurobiological processes? The answer lies in the interaction between personal and social context variables in which the perceptual process is happening. For example, we can observe a difference in the meaning of the

nuns and the Buddhists, and this difference is a consequence of the very different religious and nonreligious backgrounds of these persons. In other words, the same neurobiological event is interpreted in different ways, i.e., the percept is different and is described in different languages, because of what each person brings to the task of seeing and interpreting what is in fact the same core neurobiological event. The understanding of this becomes more apparent when social psychological principles are invoked.

The attribution process is perceptual. It is based on how humans perceive wholes where there are parts, see pattern in a stimulus whether or not pattern is there, and how people read meaning into events. Attribution theory is an intellectual descendant of the gestalt psychology of perception from the 1930's. The gestaltists demonstrated how humans can look at an incomplete visual stimulus such as three lines drawn at angles from each other whose ends almost (but don't) touch at the three corners, and "see" a triangle, a fully closed visual stimulus. Our visual systems are constructed so as to "fill in the gaps" at the corners, even though the lines do not actually meet. Similarly, it is possible for people to be given random presentations of stimuli, such as a random series of letters or tones, and have them report that they see a pattern. For example, Hood and Morris (1981) document an experiment in which whether a person brings an intrinsic or an extrinsic orientation to religiousness, combined with situational cues that prompt religious thoughts, determines whether people who are sensory deprived by floating in a tank of water interpret their mental images while submerged as religious or not. Overall, those who have unusual mental experiences while under sensory deprivation and who have a religious mental set, schema, or motivation and expectancy, are more likely to report their experiences in religious terms, in comparison to those who do not have such preparatory factors (Hood, 1995). Parallel landmark findings by Pahnke (1970) showed that people who were unknowingly given psilosiben were more likely to report spiritual and religious experiences if they are witnessing a Good Friday church service, in comparison to persons not given psilosiben. In cross-cultural data consistent with this, university students in Leuven, Belgium, report that religious experiences are associated with other religious indices such as an open belief structure, religious practices and knowledge, and the act of praying (Verhoeven, 1992). Overall, attributions of this type are inferences in which meaning is constructed in order to interpret a more-or-less unstructured set of

sensory data (Spilka & McIntosh, 1995).

Generalizing this perceptual process to the problem of perceiving all of life or the cosmos, it is easy to understand the human need to fill in the gaps, so to speak, and perceive a complete whole although the data come to us in discrete bits and pieces. We can attribute meaning, plan, and purpose to the universe whether or not it is "actually there." This is a result of the built-in tendency of our perceptual systems to see consistency and pattern and to construct and give meaning in the face of ambiguity. This depends on social context, preparatory mental set, and schemas.

Schemas, Social Context, and Mental Set. Religion as a whole is not a schema, but we have many specific religious schemas – Catholic schema, Jewish schema, Islamic schema, Evangelical Christian schema, etc. (Paloutzian & Smith, 1995). A schema is a cognitive structure that filters and organizes incoming information and guides perceptions and behaviors. For example, a person with a Jewish schema is less likely than a person with a Catholic schema to "see" the Virgin Mary in an ambiguous stimulus such as the shape of the water stains on the side of a glass window (as did occur in the US in the late 1990s). Similarly, the Buddhists and the Nuns in the Newberg et al. (2000, 2001) studies each attributed a meaning to the ambiguous stimulus that they were experiencing that was consistent with their own religious tradition – a union with God for the Nuns and a connection with everything for the Buddhists — not merely because the neurobiological events were different but because of the different schemas they brought to the task. The classical descriptive accounts of experiences reported by James (1902) parallel these and are subject to the same analysis.

The situational context in which experiences occur and in which a schema is invoked is also an important determinant of the meaning attributed to it. As a mundane example, in church people have increased religious perceptions. For example, the music of J.S. Bach is often considered to be religious music, but two factors in interaction might heighten the odds that religious meaning will be attributed to it. One is when those who hear it are personally religious (i.e., they hear through their particular religious schema), and the other is when it is heard in church (i.e., a uniquely religious setting in which to hear it).Therefore, it is the combination of the schema that the person brings to the task and the context in which the attribution must be made that determines the person's personal set – the tendency to "see" an experience one way

versus another.

In sum, experiences like those reported by James and Newberg and Persinger may actually be very similar at the core neurobiological level but interpreted differently because of the preparatory mental set brought to the perceptual task by the person in combination with schemas, context, and motivational predisposition. This means that it is at the level of the whole person that we are able to understand how such experiences happen, not merely at the level of neurobiological factors. This analysis is in accord with and argues for the approach of a social cognitive neuroscience (Ochsner & Lieberman, 2001) of religious experience, not a neuroscience of it.

Assessing the Validity of Experiences

If we learn how religious experience is determined, to what degree does this tell us about the validity of those experiences, e.g., the degree to which people who have said that they have seen God actually have seen God? This question may be on the edge of the scientific neurotheology discussion, but it is wise to address it in order to remind us exactly what knowledge about such processes does and does not say about God.

The above small sketch of data interpreted with an integrative social cognitive neuroscience approach suggests that having a religious experience is more likely when a person has a schema of a particular religious tradition, is in the presence of others who are having religious experiences, or is in some other environment that would foster religious attributions because of the preparatory mental set and situational cues that interpret the information through a religious perceptual system. Such would be the processes, theoretically speaking, that would increase or even make possible religious experience.

This summary of some of the research on the psychological bases of religious experience inevitably points to the issue of the validity of religious experience. This issue can be understood in two different ways: (a) To say that an experience is valid can mean that it is "real" for the person, or (b) it can mean that the experience is ontologically valid, that is, that the percept that is in the person's mind-brain corresponds to an entity that exists "out there" in objective reality.

The first type of reality is more-or-less easy to establish. If someone says "I perceive life as very meaningful," and the speaker and hearer both have a

reasonably congruent understanding of what is meant by the word "meaningful," then we would say that the experience is valid for the person. Validity is assessed by common agreement.

Ontological validity, on the other hand, is tougher to establish. In ordinary life it does not seem terribly difficult to establish, so long as we are talking about the existence and perception of concrete objects that we all think exist. For example, if we say "I perceive an apple," and everyone else also claims to perceive the same apple, then there is sufficient common agreement so that we will together conclude that the claimed perception is valid. But what if not all people see that apple? If only one person claims to see the apple but no one else does, how do we decide whether the claimed perception is ontologically valid?

Extrapolate this example to the case of someone who claims to see a vision of God, to hear God's audible voice in a literal sense, or to experience some other unique apparition or to have a special ability to do so, such as a technique to communicate with the dead or to see angles, and instantly we comprehend the problem: the claimed percepts are incongruent—most people don't have them. The extension of this dilemma to the question of the perception of God in purported religious or mystical experiences, or any other claimed "special" state of consciousness, is straightforward. Most people do see the apple, but most people do not see God. (Popular language about "seeing" God or "hearing" God's voice is usually understood in a nonliteral sense.) It is particularly problematic when we remember that in most theologies God is supposed to be invisible. If God is invisible and has no shape, then what are we supposed to make of someone's claim to have seen God?

Research data are clear that reports of religious experience are determined partly by the interaction of situational factors and the religious and motivational variables that a person brings to the perceptual task. This suggests that the probability of having a religious experience and the belief in its validity can be manipulated by personal mindset and environmental cues. If the apparent validity of religious experience is so manipulable and plastic, then how is it possible to assess it? We suggest that although psychology and neurobiology are powerful in revealing how people come to believe that their own religious experience is valid, they are not able to tell us whether they are so. This task remains for other areas of study.

SOCIAL-COGNITIVE PICTURE OF THE PERSON

We are introducing the social-cognitive argument into the neurotheological dialogue in order to present a picture of human beings that is consistent with a social cognitive neuroscientific approach. This picture is not a purely rational one. For example, the data show that what a person purports to have experienced is predictable by psychological variables and is manipulable by environmental and social conditions. Further, what it means to claim that an experience is valid is at issue. The very problem of ascribing validity to a phenomenological experience (e.g., to make a supernatural attribution about its cause) is itself a construction arrived at by an attribution process.

The research in social psychology, stemming from an overall cognitive consistency orientation that began with cognitive dissonance theory but has a more powerful intellectual descendent in attribution theory, suggests that we do not arrive at our conclusions by means of a purely rational or singular process. This means that the questions we are posing cannot be answered in the form in which we are asking them. Perhaps there are only parts where we want to see a whole. From schema theory, we think that there is a mental structure that guides our perception of the elements of this problem, and the attribution approach adds some understanding about the circumstances that lead us to come to certain conclusions or inferences. However, this kind of research says that the process has to be understood at primarily a psychological level. We may think what we think for a variety of reasons, conclude what we may unknowingly be preset to conclude, and then construct a rationale and basis for doing so. We may also construct meaning for it in either theological or atheological terms.

31. Brains, Science, Paranormal, Mystical & Transcendent Experiences:

by William Braud
Institute of Transpersonal Psychology, Palo Alto, California.

What if you slept, and what if in your sleep you dreamed, and what if in your dreams you went to heaven and there you plucked a strange and beautiful flower, and what if when you awoke you had the flower in your hand? Ah, what then? --Samuel Taylor Coleridge, Biographia Literaria (1817)

In this chapter, I hope to present a balanced account of both the strengths and limitations of conventional cognitive science and neuroscience, as these attempt to address and explain nonordinary and transcendent experiences (NTEs). These NTEs include, but are not limited to, mystical, spiritual, and paranormal experiences. Although some findings and theories of experimental psychology, cognitive science, and neuroscience may explain, and be quite relevant to, certain aspects of these nonordinary experiences, these explanatory concepts are not yet able to deal adequately with other aspects of these experiences. In particular, current cognitive science and neuroscience are unable to account for well-researched cases in which NTEs yield veridical knowledge about sensorily inaccessible events or in which they are associated with objectively measurable influences upon others or upon the physical world—at a distance, and beyond the reach of our conventional means of action and influence. I also will present material relevant to the issue of whether the human brain might wholly produce consciousness or whether it might serve, rather, as a vehicle for the transmission and expression of consciousness. Before treating attempts to understand or explain these nonordinary experiences, it is important to examine more closely the nature of the experiences themselves.

Nonordinary and Transcendent Experiences (NTEs)

Our familiar, ordinary experiences and actions have increasingly been brought within the growing framework of scientific understanding. Physical substrates—or, at least, physical correlates— have been found for many of our mundane activities (our sensations, movements, and memories) and even for some of our more exotic experiences (our imagery, dream conditions, and volitions). Nonetheless, there have always been forms of experience that have persistently evaded capture by science's explanatory net—experiences that

intimate that there is more to our human nature and human potential than is portrayed by the conventional models and theories of physiology and psychology. It was to such exceptional experiences that William James (1890/1956) was referring when he suggested that:"The great field for new discoveries . . . is always the unclassified residuum. Round about the accredited and orderly facts of every science there ever floats a sort of dust-cloud of exceptional observations. . . . Any one will renovate his science who will steadily look after the irregular phenomena. And when the science is renewed, its new formulas often have more of the voice of the exceptions in them than of what were supposed to be the rules (pp. 299-300)."

James (1902/1985) had similar experiences in mind when he wrote: "Our normal waking consciousness, rational consciousness . . . is but one special type of consciousness, whilst all about it, parted from it by the filmiest of screens, there lie potential forms of consciousness entirely different.

We may go through life without suspecting their existence; but apply the requisite stimulus, and at a touch they are there in all their completeness, definite types of mentality which probably somewhere have their field of application and adaptation. No account of the universe in its totality can be final which leaves these other forms of consciousness quite disregarded (p. 388)."

Historically, these unusual experiences have been given many names—supernatural or paranormal experiences being, perhaps, the most frequent of these. The 18th century scientist-turned-mystic, Emanuel Swedenborg (1756/1998), in his Arcana Coelestia, described experiences similar to these when he coined the term remains, which Swedenborg scholar Wilson Van Dusen paraphrased as "our inner memory of everything sacred . . . [our] personal treasure of spiritual understanding . . . [our] sacred personal collection of little realizations of heaven" (Van Dusen, 2001, pp. 97, 106). William James himself referred to these experiences as white crows, reminding us that "if you wish to upset the law that all crows are black, you must not seek to show that no crows are; it is enough if you prove one single crow to be white" (1890/1969, p. 41). In 1919, the irrepressible gadfly journalist Charles Fort used an equally picturesque phrase, damned facts, to describe similar recalcitrant exceptions and embarrassments to the received science of his day (Fort, 1941). Other names for these and similar experiences have included peak experiences (Maslow, 1962), Minerva

experiences (Otto, 1966), transpersonal experiences (Grof, 1972), extraordinary phenomena (Masters, 1974), transcendental experiences (Neher, 1980), extraordinary experiences (Helminiak, 1984), praeternatural experiences (Nelson, 1989), metanormal functioning (Murphy, 1992), exceptional human experiences (EHEs, White, 1993), wondrous events (McClenon, 1994), high holy moments (Van Dusen, 1999, p. 76), and—as we have seen—anomalous experiences (e.g., Cardena, Lynn, & Krippner, 2000; Reed, 1988; Zusne & Jones, 1989). In this chapter I prefer to call these experiences nonordinary and transcendent experiences (NTEs)—nonordinary because of their relative rarity and unfamiliarity, and transcendent because they go beyond the conventional understanding of human potential and of the world and because, under special circumstances, such experiences can trigger transformative changes, and working with such experiences can allow the transcendence of what one was before the experience. To facilitate our discussion, I will focus on two particular forms of these NTEs—mystical/unitive experiences and psychical experiences.

Mystical and unitive experiences are those in which there is a strong sense of greater connection, sometimes amounting to union, with the divine, other people, other life forms, objects, surroundings, or the universe itself. Often, this is accompanied by a sense of ecstasy or of being outside of one's "skin-encapsulated [individual] ego" (Watts, 1963, p. 18) or self identity. Related to this is the pure consciousness event that has been studied extensively by Forman (1990, 1999), who defines this as "a wakeful though contentless (nonintentional) consciousness" (1990, p. 8), and considers this a form of introvertive mysticism (Stace, 1960).

Psychical experiences are those in which we learn about or influence the world through means other than the conventionally recognized senses, motor systems, or their mechanical extensions, or rational inference, in cases in which chance coincidence has been ruled out. The major forms of psychical experiences are well known as telepathy, clairvoyance, precognition, and psychokinesis; and these can be augmented by experiences and events suggestive of survival of bodily death.

Originally having the meaning of feeling (more literally, suffering) at a distance, telepathy is now understood as accurate, direct knowledge of the mental content or subjective experiences of another person, typically at a distance—a kind of mind-to-mind communication or interaction. An example

would be my accurate discernment of a pain in the left thumb experienced, right now, by someone who is reading this chapter. Initially having the meaning, among the French, of clear or distant seeing, clairvoyance is now described as accurate, direct knowledge of some objective event— again, usually at a distance; this is a kind of mind-to-object communication or interaction. An historical example of clairvoyance is an incident, investigated by an agent of Immanuel Kant, in which the 18th century scientist-turned-mystic, Emanuel Swedenborg described the timing, nature, and progression of a fire that was raging in a distant city, 300 miles away; two days later, a messenger arrived and revealed the accuracy of Swedenborg's prior report. In precognition, one displays accurate knowledge of future events that, according to our conventional view of time, have not yet occurred and that could not have been predicted on the basis of rational inference, nor accounted for on the basis of chance coincidence; premonitory dreams are common examples of precognition. Psychokinesis (sometimes called telekinesis) indicates mind-matter interactions in which one's attention and intention may directly influence other persons, other living systems, or inanimate physical systems—usually at a distance; such psychokinetic influence are most often detected in sensitive physical or biological systems that are rich in free variability or randomness. It has been suggested that some instances of unusual healing (especially "distant healing") may involve psychokinesis. Afterdeath or survival research addresses findings that suggest that some aspect of human personality might survive the death of the physical body. This is the more controversial branch of psychical research that concerns itself with such phenomena as apparitions of the dead, hauntings, some poltergeist occurrences, mediumistic communications, mediumistic physical phenomena, out-of-body experiences, near-death experiences, and reports suggestive of past lives and reincarnation. The difficulties these psychical experiences pose for conventional cognitive and neuropsychological interpretations—and even for physical interpretations—are treated in detail, below.

Forms of Psychical NTEs That Brain Science Can and Cannot Adequately Address

Within each class of NTEs, there is a range of experiences that vary widely in their characteristics. Some experiences are true instances of their class, and

we might call these veridical NTEs. Other experiences may superficially resemble veridical NTEs but, upon more careful examination, can be found to be ordinary experiences in disguise. Still other experiences may be complex blends of these two forms—they may be veridical NTEs that also happen to have some ordinary features, or they may be ordinary experiences that, nonetheless, possess some veridical, nonordinary qualities.

The range and complexity of these experiences call for great care and discernment on the part of investigators who wish to study these phenomena seriously. Facile tactics of treating these experiences as homogeneous groupings that can be attributed entirely to quirks of the brain or to supernatural visitations simply will not do. Rather, careful attention to the details and full nature of the experience in question, and the ability to make sometimes subtle discriminations, are essential tools for adequate understanding in this area of study.

Let me illustrate the investigatory issues by means of a simple example. The déjà vu experi-ence is characterized by an often intense feeling of familiarity upon encountering a situation that is "really" novel. I visit a foreign city that I have not previously visited or learned about. On my first stroll through the center of town I see someone who is wearing a light blue suit, holding a walking stick, and standing in front of a large glass window. I have a curious feeling of having seen this, done this, been here before. The feeling may be sufficiently eerie as to be accompanied by gooseflesh and a tingling of my spine or scalp. What are we to make of this experience? Several interpretations come to mind:

1. The experience is not really occurring; I am pretending to have such an experience in order to gain attention, to fool someone, or to play a game.

2. Although novel, the street scene does closely resemble one that I have seen before, and the familiarity is attributable to a real memory of something similar.

3. On this particular occasion, there is an unusual delay in the transmission of information across my corpus callosum and other fiber tracts that connect my two cerebral hemispheres; so, I really have experienced this before—a tiny fraction of a second before—in one hemisphere, before the information registers a second time in my other hemisphere.

4. I experience unusual firing of neurons deep beneath my temporal lobe, in my brain's familiarity area, and the feeling of familiarity is simply a quirk

of peculiar brain activity—a microseizure, as it were, in a particular, localized area of my brain; what I happen to be observing at the time (the street scene) is irrelevant to the familiarity experience.

5. I have had an earlier precognitive dream about this very encounter, and when I observe the street scene, I have already seen it before—in my prior dream—so, the experience naturally seems familiar.

Notice that, from the limited information of only my verbal report of having a déjà vu experience, an independent investigator could not know, with any certainty, which of these five interpretations is most likely to be correct. Additional information is needed if we are to make a case for or against any one of these five potential explanations. To assess Interpretation #1, we would need additional information about my subjective experience at the time of the event in question; it might also be useful to know something about my history, motives, and predispositions. To assess Interpretation #2, information about my prior experiences and my memories would be needed. To assess

Interpretations #3 and #4, a record of my brain activity during the event in question would be needed. To assess Interpretation #5, a record of the content of my earlier dream would be useful; for this to be convincing, the record should have been made before the later déjà vu experience.

With respect to the above scenarios, it is important to recognize two things. First, to infer the correctness of Interpretations #3 and #4 in the absence of the requisite brain activity indicators is entirely speculative, and to automatically conclude that one or both of these interpretations is correct is risky and no more likely to be true than any of the other interpretations. Second, if a prior record of the dream had been made, had been extremely rich in specific details, and is available for study, this record could provide prima-facie evidence in favor of Interpretation #5. Note also that, given a preexisting and accurate dream record, Interpretation #5 could be valid regardless of whether or not any or any combination of the first four interpretations also happen to be true.

Now consider the following additional twist on this experience. What if, in addition to reporting the feeling of familiarity upon seeing this particular street scene, I supplement my report by saying that I have a feeling that if I pass the blue-suited person, with walking stick, near the large shop window, go to the next corner, turn right, and continue on for one and a half blocks,

there will be small shop with a yellow elephant painted on its front door? What if I perform the experiment, check out the predicted location, and do, indeed, find what was described? What if had made that "elephant on the door" prediction at the time I experienced déjà vu and mentioned that I thought the experience would next unfold in that way? Or, what if the "elephant on the door" had also been included as part of my earlier dream record? In both of these cases, I can imagine no conceivable way in which the electrical or neurochemical activities within my brain—either at the time of the dream or at the time of the déjà vu experience—could account for the accuracy of my prediction. This is because the phenomenon to be explained does not behave—with respect to distance, time, or barriers—in ways that the known brain activities, or their concomitants or sequelae, behave. Something more is needed to account for this veridical NTE, above and beyond what currently is known about the brain and its functioning.

The possibilities and principles present in the above account illustrate well the strengths and limitations of attempts to explain, or explain away, certain unusual experiences based solely on the findings and constructs of brain science. If we replace the déjà vu experiences with any of a wide range of NTEs, similar alternative interpretations and arguments arise. We can generalize these possibilities further by substituting any of the varieties of psychical functioning (telepathy, clairvoyance, precognition, psychokinesis, afterlife or survival evidence) for the déjà vu experience, and slightly reframing the various interpretations in the following ways:

Ostensible psychical experiences such as telepathy, clairvoyance, precognition, psychokinesis, or experiences suggestive of an afterlife or survival of bodily death may be explained on the basis of:

1. Fabrication or hoaxing of the experiences,
2. Misperceptions and distortions of observation or of memory,
3. Subtle sensory cues—whether consciously attended to or not—that might betray the nature

of the event that is to be known or perceived,

4. Rational inference—through which the nature of the to-be-known-or-perceived event might be determined or guessed,
5. Chance coincidence, or
6. Quirks of the brain that simulate the psychical experience.

For those predisposed not to accept the reality of psychical experiences,

parsimony would demand that the foregoing six explanations be considered immediately and that only after these possibilities have been carefully and completely ruled out would one entertain the possibility of the presence of a veridical NTE. Note, again, that if there is evidence of a specific and strong correspondence between the content of a subjective experience and the content of some referent event (distant or remote in space or in time), the absence of the first five of these explanations would guarantee that the referent event would be conventionally inaccessible to brain and cognition. Further, if these five possible explanatory conditions are absent, the presence or absence of Explanation #6 becomes irrelevant in identifying the experience as a veridical NTE. In other words, brain quirks—of any sort— can explain a subjective experience but cannot explain the presence of an accurate connection between that subjective experience and some inaccessible referent event. For example, a particular brain pattern can be shown to underlie—and "explain"—an image of her son that arises in the mentation of a mother sitting before a hearth and idly watching the dancing flames, but the presence of that brain pattern cannot explain the sudden arising of that particular image at the precise moment that the son is experiencing a life-threatening situation, thousands of miles away (an instance of socalled crisis telepathy), nor can the brain pattern explain the strong correspondence that happens to occur between the two conventionally unconnected events of the mother's imagery and the distant son's desperate, momentary circumstance and need. Stated in still another way, brain activities (or any other bodily activities or conditions) can explain many, and perhaps all, subjective experiences themselves, but cannot explain the timely and accurate connections or relationships between those subjective experiences and meaningfully related distant events.

Difficult and Easier Discriminations

It is often difficult to analyze and evaluate psychical experiences that occur spontaneously in everyday life circumstances. It is not always clear whether there are or are not peculiar brain activities associated with these experiences. Often, it is difficult to determine, with certainty, whether the confounding factors of deliberate misrepresentation, hoaxing, misperceptions, distortion of observations or of memory, subtle sensory cues, rational inference, or chance are present or absent in any given case. Because brain activities and conditions are active in all of these confounding factors—it is likely that

brain activities are present in all cognitive activities because they serve as the vehicles of expression for these activities—in this sense, brain activities can "explain" many NTEs. If it were possible to connect an NTE with some conventionally inaccessible referent event, however, and if it were possible to rule out the confounding factors just mentioned, then veridical NTEs could be identified fairly unambiguously even in everyday life circumstances. Indeed, for the past 12 decades—dating, at least, from the founding of the Society for Psychical Research (SPR) in England in 1882—countless observations and records have been made of apparently genuine veridical psychical experiences. These have been published in the Proceedings of the SPR and the Journal of the SPR, in the Proceedings and Journal of the American SPR, and in similar psychical research and parapsychology journals in many countries, and these findings have been compiled and discussed in numerous scholarly volumes (e.g., Myers, 1902; Stevenson, 1970; Wolman, 1977). These reports of spontaneous psychical experiences vary greatly in the quality of the evidence that they present. As would be expected, this evidence has been questioned by counteradvocates of these claims—with varying degrees of plausibility and success—and a number of reasonable critiques of this literature have been published (e.g., Kurtz, 1985).

Ruling out possible confounds more effectively and identifying veridical NTEs more unambiguously become possible when these experiences, or experimental analogs or models of these, are brought into the laboratory for careful study. Large numbers of experimental studies of telepathy, clairvoyance, precognition, and psychokinesis have been conducted and reported in professional parapsychology journals (e.g., the Journal of Parapsychology), as well as in many "mainstream" journals (e.g., Nature, the Journal of Experimental Psychology, Psychological Bulletin, and many clinical and medical journals).

Through the years, the investigations of experimental parapsychology have become increasing sophisticated, criticisms of earlier work have been effectively met, and present studies match or exceed those of conventional behavioral and biomedical research in the tightness of their designs and in their safeguards against artifacts and confounding variables. The experimental designs effectively rule out the possibility of ordinary sensory cues, rational inference, and chance coincidence, so that if consistent relationships are found between subjective experiences and distant and

shielded target events, such evidence cannot be explained in terms of conventional informational or energetic transfers or mediation, nor can these correspondences (see previous section) be accounted for in terms of the brain activities or conditions of the research participants. Even a cursory review of the vast literature of experimental parapsychology is beyond the scope of this chapter. Rather than attempting to summarize the results of these investigations, I will simply indicate some of the more important sources to which interested readers may go to acquaint themselves, first hand, with the methods and outcomes of these studies. These resources include the Proceedings and Journals mentioned earlier in this section, the Journal of Parapsychology, the European Journal of Parapsychology, the International Journal of Parapsychology, and careful and extensive treatments of relevant literature in volumes by Broughton (1991), Griffin (1997), Krippner (1977-1994), Kurtz (1985), Radin (1997), Targ, Schlitz, and Irwin (2000), and Wolman (1977).

Extensive reviews and meta-analyses are available for compilations of findings from the largest and most successful research projects. These projects include studies of remote viewing (clairvoyance experiments usually involving distant geographical sites, buildings, and natural and human-made features as targets; Nelson, Dunne, Dobyns, & Jahn, 1996; Utts, 1996); waking state of consciousness, free response, extrasensory perception studies (Milton, 1993); dream telepathy studies (Child, 1985); mixed telepathy and clairvoyance under conditions of sensory restriction ("ganzfeld" studies; Bem & Honorton, 1994; Storm & Ertel, 2001); experiments conducted under conditions of nonordinary states of consciousness induced by relaxation, hypnosis, and meditation techniques (Honorton, 1977; Schechter, 1984; Stanford & Stein, 1993; Storm & Thalbourne, in press); precognition experiments (Honorton & Ferrari, 1989); psychokinesis experiments involving inanimate electronic and mechanical random target systems (Dunne & Jahn, 1992; Dunne, Nelson, & Jahn, 1988; Radin & Ferrari, 1991; Radin & Nelson, 1989; psychokinesis (direct mental influence) studies involving living target systems (Braud & Schlitz, 1991; Schlitz & Braud, 1997); and even time-displaced psychokinesis (retroactive intentional influences) studies (Braud, 2000).

Although these processes of telepathy, clairvoyance, and precognition have been noticed and recorded throughout history, and also have been

documented in careful laboratory studies, their existence, to some, remains controversial. Alternative explanations and critiques of such phenomena have been made, again, throughout history, by skeptics and counter-advocates of such claims. In my opinion, these phenomena are genuine. The evidence is more than adequate scientifically, and there appear to be increasing reasons to accept that psi phenomena are real and not accounted for by conventional scientific models. I base this judgment upon my own experiences of them, my observations of their occurrence in my own laboratory under well-controlled conditions, similar observations by colleagues whose work I know and trust, and from my examination of much of the published literature on these phenomena. A reasonable and balanced approach to judging claims about these processes would be to examine carefully and dispassionately the published primary reports, read the critics' arguments, read the counterarguments to these, recall your own—and others'—lived experiences of similar incidents, and then draw conclusions based upon the fullest possible amounts of evidence and argument.

Aspects of Veridical Psychical NTEs That Brain Science Can & Cannot Adequately Explain

As mentioned previously, neuroscience and cognitive science can adequately account for the nature of the physiological and psychological conditions that occur in persons while they are having veridical psychical NTEs. They can identify the brain states that might be present during NTEs, and they can explain a great deal about the processes underlying these brain states and how these brain states change and are influenced in conventional ways. Neuroscience, cognitive science, and conventional psychology are also valuable in that they can help us identify and understand unusual physiological and psychological conditions that can simulate and be mistaken for veridical NTEs (abnormal electrical and epileptiform activities in the brain's temporal regions, memory distortions, nocturnal "paralysis" due to extreme reductions of muscle tension during certain sleep and dream conditions, various dissociative conditions, profound changes in attention, etc.).

What current brain science cannot explain is how brain conditions that allow the expression of accurate psychical knowledge come to occur at times that match the arising of the distant target events with which these

physiological and subjective conditions are so well correlated and which can be so faithfully mirrored or described by these physiological and subjective changes and contents.

Brain science can help me understand what the physiological substrates of an image of an apple might be, but it cannot help me understand why that particular substrate should happen to arise at the precise moment that someone 1,200 miles away is viewing a picture of an apple and holding a strong intention that I become accurately aware of what that person is viewing, in a mixed telepathy/clairvoyance parapsychology experiment.

The reason brain science is of no help in explaining the kinds of curious meaningful and co-arising correspondences with which parapsychology and psychical research deal has to do with the nature of the paradigm with which brain science currently is aligned. According to this paradigm, brain states can only be created or influenced by genetic predispositions, local internal bodily and psychological conditions, information that arrives through the conventionally recognized senses, and direct or indirect influences of the four forces currently recognized by contemporary physics (electromagnetism, gravitation, strong nuclear force, and weak nuclear force). Both parapsychology and conventional science recognize that, given our present understandings of the processes just mentioned, none of them—alone or in combination—can adequately account for the findings of psychical research or for the curious behaviors of the phenomena found in this field of study. For brain science to adequately address psychical findings, its paradigm must be expanded to allow for other processes or principles to influence brain functioning or it must admit that some subjective (experiential) events might exist or change independent of brain or of brain activity changes.

We can clearly illustrate the difficulties that neuroscience and cognitive science face, in attempting to explain veridical psychical NTEs within the current paradigm, by examining how pathways of action typically are handled within this paradigm. If—in instances of telepathy, clairvoyance, or precognition—a person acquires new and accurate knowledge about a distant "target" event, how might such knowledge be acquired? Brain science contends that new information can be made available to the brain only through conventional sensory channels or through recombinations of already available information. If conventional sensory signals are blocked—as in all well-designed parapsychology experiments—what could remain that could

carry the requisite information?

A transmission model would assume that information or energy is transferred from point to point—from a target source or "sender" to a percipient or "receiver"—carried by some form of mediator through some sort of channel. An early form of this model was the mental radio analogy. Just as intelligence could be conveyed electromagnetically from a transmitter to a receiver, so too, perhaps, psychical knowledge or influence could be similarly transmitted and received. [It is not well known that a major instrument of modern neuroscience, the electroencephalograph or brain-wave device, was invented by the German scientist Hans Berger, in 1924, in an attempt to detect and measure weak electromagnetic emanations of the human brain that he believed might be the carriers of telepathic communication (see Brazier, 1961; Roll, 1960).] Many hypothetical carriers have been proposed for these psychic transmissions, including electromagnetic waves, neutrinos, tachyons, and so on. The latest contender is extremely low frequency (ELF) radiation. All such transmission models, however, face serious difficulties in explaining the operating characteristics of psychical effects.

These effects occur over great distances, and they do not seem to decline appreciably with distance, as do conventional forces. No method has yet been found to physically shield or prevent psychical effects or to amplify them. The psychical process has great discriminating power, or acuity, which is difficult or impossible to handle via conventional information carriers. Whereas ELF radiation does have great shield-penetrating power and can carry information over great distances with minimal signal loss, its information handling capacity is low (due to its long, slow waves)—too low to be able to handle the kinds of rich and rapid knowledge that sometimes can be communicated psychically. Furthermore, we know of no conventional mechanism or process through which information could be encoded from the brain of a sender onto an ELF carrier wave and then properly decoded by the brain of a receiver. Most difficult of all, for the physical and neuroscience paradigm, is the apparent disregard of psychical events for the usual constraints of time: Conventional forces interact with matter in the present moment and do not travel forward or backward in time; however, future and past events are psychically accessible, in instances of precognition, retrocognition, and retroactive intentional influence. In summary, the brain is

a physical organ, and known physical organs simply do not operate in ways in which psychical events and experiences have been shown to operate.

Can Brain Science Adequately Address Mystical and Spiritual Experiences?

Thus far, we have been focusing on veridical psychical NTEs. Let us turn now to mystical and spiritual experiences and explore whether brain science fares any better in accounting for these forms of nonordinary and transcendent experience.

As in the case of psychical NTEs, it is clear that brain science can, indeed, account for some of the features of mystical and spiritual experiences. Intriguing findings relating brain states or conditions to certain types of mystical and spiritual experiences have recently been reported by neuroscientists, including Joseph (1990, 1996; d'Aquili and Newberg (1993, 1999); Fenwick (1996); Fischer (1971); Newberg, d'Aquili, and Rause (2001); and Persinger (1983, 1987). Brain stimulation studies and brain monitoring studies have linked activities in certain brain loci to subjective features similar to those that occur in mystical and spiritual experiences. These include changes in spatial and temporal perception, the feeling of a loss of the sense of self, and the feeling of "presences" of various sorts. These findings, along with descriptions of the methods that have yielded them, are provided, in great detail, in other chapters of this book. Important research on the psychological characteristics of mystical and related experiences has been carried out, as well, by investigators outside of this neuroscience tradition (e.g., Deikman, 1963, 1966, 1971; Forman, 1990, 1999).

The four most important characteristics of the mystical experience have been described as its ineffability, noetic quality, transiency, and passivity (James, 1902/1985). Additional characteristics attributed to this experience have included feelings of unity, numinousity, loss of ego, an altered appreciation of space and time, perceptual experiences and alterations, changes in affect, transformative changes, and paradoxicality (e.g., Stace, 1960). Other "spiritual" experiences have shared various of these qualities, and, in addition, may have included feelings of the presence of the divine, of angelic or other spiritual presences, and self-perceived encounters with various spiritual entities. An important "neurotheological" project would be to investigate carefully whether and how each of the qualities of naturally-

occurring mystical and spiritual experiences might also occur in laboratory-induced versions of these experiences. Such studies—although difficult and challenging to do well—could be helpful in determining how closely the ostensibly mystical or spiritual experiences studied or induced in the laboratory resemble the naturally-occurring forms: Are they virtually identical, identical in some aspects only, or different in important ways? It is possible that neuroscientific and cognitive considerations may adequately account for some, but possibly not all, of the features of mystical and spiritual experiences.

The extensive studies just suggested should be carefully designed so as to exclude or eliminate the possible biasing role of the investigators' own beliefs and expectations, subtle suggestive features of the settings and experimental procedures, and various other demand characteristics (Orne, 1962) of the experiments. It is well known that study outcomes can be influenced importantly by these various experimenter effects (Rosenthal, 1976). I suspect that some, or even a great deal, of the findings of various neurotheological studies (e.g., the work of Persinger and his co-workers [Cook & Persinger, 1997, 2001]) might have been contributed by subtle and not-so-subtle experimenter effects and demand characteristics that had not been adequately controlled for in these investigations, rather than by the ostensible interventions. I consider this an extremely important methodological consideration in evaluating results of prior work and in planning more adequate future investigations.

In a recent paper (Braud, 2002a), I suggested ways in which various psychological principles might account for the alleged ineffability of the mystical experience. Ineffability, of course, refers to an inability to report adequately, in words, the contents of an experience. The psychological principles addressed in the cited paper included (a) an expansion of awareness from a limited, focal, readily-described center to an extremely rich, complex, and extensive—and, hence, difficult or impossible to articulate —margin of the field of consciousness (building on seminal contributions by Frederic Myers [1903] and by William James [1910/1980]), (b) an attentional shift from a discrete figure to a large, complex, and novel ground, (c) limitations imposed by the nature of the "object" of the experience and by our vehicles of perception and cognition, (d) difficulties of memory transfer from nonordinary to ordinary states of consciousness (building on findings of

the state-dependent features of some forms of learning and memory), and (e) constraints imposed by brain structures, culture and tradition, and self-fulfilling prophesies. These principles—alone or in combination— might account for some of the limitations of vehicles of expression of mystical and spiritual (and, indeed, many other nonverbalizable) experiences. However, such explanations leave open the possibility that exposure to a transcendent realm may actually occur in such experiences.

Studies of the noetic features and the possible transformative impacts of mystical and spiritual experiences—both in everyday life and in the laboratory—could play extremely important roles in investigating the adequacy of neuroscience and cognitive science explanations of such experiences. I treat noetic features and transformative impacts together because, often, profound life-changing outcomes and dramatic aftereffects have issued from the noetic aspects of mystical and spiritual experiences. These noetic aspects are occasions of knowing that occur during the experiences; this knowing has a direct, insightful, revelatory, deep, authentic quality and an impact for the experiencer that is beyond what is typically provided by or through the more familiar discursive intellect. The noesis-related changes can range from fresh perceptions, through major changes in one's worldview, to callings and changes in vocation, to experiences of profound transformation, rebirth, and "conversion" (metanoia: change of heart or consciousness). A brief sampling of profound, life-changing impacts would include life changes in the founders and followers of the major religions and spiritual and wisdom traditions (e.g., the changes following experiences of "cosmic consciousness"; see Bucke, 1901/1966), the transformative changes experienced by persons who have had near-death experiences (see Greyson, 2000) or profound experiences—which can be maintained over periods of at least 24-27 years—facilitated by psychedelic (entheogenic) chemicals (e.g., Doblin, 1991; Pahnke, 1966), and the life-impacts of exceptional experiences occurring in religious or spiritual contexts (e.g., James, 1902/1985; Pratt, 1920/1934). Waldron (1998)in reporting on the life-impacts of transcendent experiences having strong noetic features, found that these noesis-rich experiences addressed important life issues; had clearly discernable phases of integration; had profound significance to the percipient that resulted in a life orientation; had continuing noetic influences in the person's life; eventually led to creative expression of the meaning

contained in the experience; and had significant impacts on the experiencer's belief system, relationships, and sense of self.

It will be important to examine whether the types of experiences studied in the laboratory can have the depth of noesis found in the types of natural experiences mentioned above, and whether there are similarly profound aftereffects or consequences in the case of the experiences occurring in the laboratory. Examining the fruits of the various experiences can provide one way of helping us understand whether the experiences studied by neuroscientists and cognitive scientists are similar to those occurring more naturally, in everyday life conditions. Appropriate studies of the shortand longer-term aftereffects of laboratory-induced experiences have not yet been carried out. Because such aftereffects are vital aspects of the natural, to-be-explained mystical and spiritual experiences, it would be premature to conclude too much about their nature and causes from laboratory studies that have not yet addressed the presence or degree of life-impacts.

The nature of the proffered "explanation" of an NTE can also help determine its impact. An unusual experience interpreted as a quirk of the brain may not have as much of a life-altering impact as the same experience interpreted in terms of its—often profound—subjective appreciation or its personal meaning and significance. How one frames the nature and meaning of an experience— especially an NTE—and how one chooses to understand and work with that experience, more deeply and more fully, can importantly influence whether or how that experience might influence one's life or even eventuate in major transformative changes (see White, 1997). Simple interpretations as quirks of the brain would not seem to have such transformative power.

The noetic aspects, themselves, of mystical and spiritual experiences—quite apart from their possible life-impacts—have an even more direct relevance to the adequacy of interpretations based solely on brain functioning. If knowledge is gained in some of these experiences which, upon later examination, is found to have veridical aspects that could not have been explained on the basis of the experiencer's prior experience or access to that knowledge, such accurate content could not be explained readily on the basis of what is currently known about brain functioning. This kind of evidence would be a special case of the veridicality of knowledge already discussed above, in the section on psychical NTEs.

Does the Brain Produce or Transmit Consciousness?

It would be foolish to deny that certain brain structures and activities are associated with certain forms of consciousness. Such associations are supported by voluminous findings from research and clinical observations in neurology, psychophysiology, clinical and experimental neuropsychology, and related areas. However, the presence of a correlation, alone, does not provide sufficient information for concluding whether brain activities produce consciousness, or consciousness produces brain activities, or whether both consciousness and brain activities might be produced by something else. To prematurely conclude the first of the three possibilities just mentioned may be to fall prey to what might be called the fallacy of the legless flea. The possibility of this fallacy is suggested by the following fictional cautionary tale.

Once upon a time, there was an investigator who wished to find the locus of the organs of hearing of fleas. He laboriously trained a flea to jump whenever he uttered the word "jump." He then carefully analyzed his flea's anatomy to find where its ears might be located. He would say "jump," and observe a jump as an indicator that the flea had, indeed, heard him. He removed flea leg after flea leg, and the flea continued to jump whenever he commanded. When, finally, the flea did not jump, once he had removed the flea's final leg, he concluded that the flea's ears were located on that last leg, because, obviously, the flea had not heard his last jump command.

The point of this tale, of course, is to remind us not to confuse the ability to have an experience with the ability to express that experience in an observable way. To prematurely conclude that conscious content or activity might be impossible without corresponding brain content or activity may be to commit a more sophisticated and subtle form of the legless flea fallacy. This issue can be expressed, in more familiar terms, by asking whether brain structures and activities might produce or, rather, transmit consciousness.

One of the earliest statements of the brain's possible transmissive, as opposed to productive, role in consciousness was that of Ferdinand Canning Scott Schiller (1891/1894):

"Matter is an admirably calculated machinery for regulating, limiting, and restraining the consciousness which it encases. . . . If the material encasement be coarse and simple, as in the lower organisms, it permits only a little

intelligence to permeate through it; if it is delicate and complex, it leaves more pores and exits, as it were, for the manifestation of consciousness. . . . Matter is not that which produces consciousness, but that which limits it and confines its intensity within certain limits: material organization does not construct consciousness out of arrangements of atoms, but contracts its manifestation within the sphere which it permits. This explanation . . . admits the connection of Matter and consciousness, but contends that the course of interpretation must proceed in the contrary direction. . . . If, e.g., a man loses consciousness as soon as his brain is injured, it is clearly as good an explanation to say the injury to the brain destroyed the mechanism by which the manifestation of consciousness was rendered possible, as to say that it destroyed the seat of consciousness. .

. . If the body is a mechanism for inhibiting consciousness, for preventing the full powers of the Ego from being prematurely actualized, it will be necessary to invert . . . our ordinary ideas . . . [italics in original] (pp. 293-296)."

The possible role of the brain as a releasing, permissive, or transmissive organ or vehicle of consciousness, rather than a producer of consciousness, was elaborated by William James (1898/ 1960). Just as a prism alters incoming white light to form the characteristic colored spectrum, but is not the source of the light; and just as the lengths of the pipes of an organ determine how the inflowing air yields certain tones and not others, but are not, themselves, the source of the air; so, too, argued James, the brain may serve a permissive, transmissive, or expressive function, rather than solely a productive one, in terms of the thoughts, images, feelings, and other experiences it allows. Henri

Bergson (1914) and Aldous Huxley (1954) later expressed similar views of the brain as a filter or reducing valve, which served to block out much of, and allow registration and expression of only a narrow band of, perceivable reality, rather than as—necessarily—a generator of consciousness.

Today, this distinction of brain as producer or transmitter is often expressed picturesquely by asking whether the brain more closely resembles a light bulb (which is the source of the light it produces, and without which the light can no longer exist) or a television receiver (which modifies and expresses images from electromagnetic fields that exist apart from itself and which latter can continue to exist even in the absence of the receiver). The

answer to this question has relevance to whether spiritual (or any other) experiences can be completely explained by identifying brain structures and activities that are associated with those experiences (a brain-as-producer view), or whether particular brain structures and activities might simply allow the registration or expression of something that might exist, in some form, apart from the registering/expressive structures and functions (a brain-as-transmitter view).

To find activity in a particular brain area does not mean that there is no independent referent or trigger of that activity. If brain mapping indicates a pattern of activity in the brain's occipital lobe, this could be a result of spontaneous, endogenous neural firings in that area. However, it also could indicate the presence of an external visual stimulus. So, too, neural firing patterns in some "spiritual center" or "God center" of the brain could be caused by spontaneous or contrived endogenous activities of a local, internal sort. However, such firings would not necessarily rule out an independentlyexisting spiritual or divine "trigger" for such activity.

The answer to this production versus transmission question has relevance, also, to the issue of whether it might be possible for consciousness to survive, in some form, following the death of the physical body. Of course, if a strong case ever could be made for the survival of some aspects of personality or of some forms of active consciousness, after death—including afterlife evidence that could not be explained readily on the basis of psychic functioning in the living—then such evidence would be strongly suggestive that a functioning brain may not be essential to the presence of at least some forms of consciousness. Findings and discussions of issues relevant to afterlife and survival research can be found in recent works by Doore (1990), Murphy (1992), Griffin (1997), Tart (1997), Greyson (2000), and Mills and Lynn (2000). F. W. H. Myers' classic Human Personality and Its
Survival of Bodily Death (1903) remains an outstanding resource, even today.

An intriguing case that has a bearing on this production/transmission issue was recently reported by cardiologist Michael Sabom (1998; see, also, Greyson, 2000, pp. 338-341). Sabom described a near-death experience that occurred while its experiencer—a woman who was having an unusual surgical procedure for the safe excision and repair of a large basilar artery aneurysm—met all of the accepted criteria for brain death. The unusual

medical procedure involved the induction of hypothermic cardiac arrest, in order to insure that the aneurysm at the base of the brain would not rupture during the operation. The patient's body temperature was lowered to 60 degrees Fahrenheit, her heartbeat and breathing ceased, her brain waves flattened, and the blood was completely drained from her head. Her electroencephalogram was totally flat (indicating no cerebral electrical activity) and auditory evoked potentials (normally elicited by clicks presented through molded earplugs that had been inserted into her ears) ceased (indicating cessation of brainstem functioning). Ordinarily—at regular body temperature—the brain cannot function without its oxygen supply for more than a few minutes. Lowering the body and brain temperature to 60 degrees F.—by chilling the blood in a bypass machine before returning it to the body and brain—however, can reduce cellular metabolism so that the brain can tolerate complete cerebral blood flow for the 45 minutes or so required for the brain operation. The patient later reported that, apparently while under these "brain death" conditions, she had a near-death experience (NDE) in which she was able to observe and hear details of objects and happenings in the operating room with accuracy. She also experienced classic components of the NDE, including a tunnel vortex, a bright light, and different figures in the light (many deceased family members, including a distant cousin of whose death she had been unaware).

On the face of it, the experience described above might suggest that mental functioning was occurring in the absence of the usual brain conditions upon which such functioning is taken to depend. The experience cannot be explained by temporal-lobe seizure-like activities, because the continuously monitored EEG indicated no such activity. The patient's eyes had been taped shut and her ears had been blocked by the molded ear speakers that had been inserted into her ears to demonstrate that even brainstem responses to clicks were absent. If she was indeed able to describe accurately various events that transpired after she had been anesthetized, she could not have been observing them through usual sensory means, nor could she have inferred the specific details that she reported.

To me, however, there are still ambiguities in this case that prevent our considering it a definitive demonstration of mental functioning in the absence of brain functioning. These reservations have to do with the timing and accuracy of the reported events, as well as the thoroughness of auditory

masking by the earplugs. A satisfactory evaluation of this striking case would require answers to the following questions:

1. Were the descriptions of operating room events and objects sufficiently detailed so as to compel confidence in their accuracy?

2. Did the earplugs adequately prevent hearing of the various operating room sounds (conversations, particular musical selections) that were occurring during the operation (recognizing that even with closed ears there may have been the possibility of hearing via bone conduction); were these possibilities considered and adequately discounted?

3. Just when did the patient's subjective experiences occur, relative to the actual temporal occurrence of the events described? Only if the experiences themselves occurred during the periods of actual "brain death" would they have a bearing on the possibility of mentation in the absence of brain functioning. At first, this may seem a curious question. However, given the evidence for precognitive and retrocognitive experiences—from careful work in experimental parapsychology and psychical research—it is possible that the patient became aware of the during-brain-death-period events but became aware of these before or after the period of brain death, when the brain was functioning normally, and misconstrued the temporal ordering of subjective experiences and described events.

4. And, finally, the patient did not die; certainly there were residual processes (perhaps anatomical, perhaps biochemical, and perhaps even extremely subtle electrical processes) that continued to function even during the "brain death" period at sufficient levels so as to allow the continuation of, and return to, full brain and body functioning after the hypothermic operation. Even if the subjective experiences did occur during the brain-death period, sufficient brain functioning must still have been present to allow memories of the experiences to have been formed and persist until later (this assumes, of course, that brain functioning is necessary to support registration, storage, and retrieval of memories).

If the above four sets of questions could be adequately addressed, the intriguing findings from this and similar cases would pose great difficulties for attempts to account for unusual experiences solely on the basis of current models of brain functioning and activity.

THE NEED FOR DIFFERENT, MORE INCLUSIVE, AND MORE

INTEGRATED MODELS AND CONCEPTUALIZATIONS?

In this chapter, thus far, brain and mind have been discussed as through they might be separate entities or qualities, and the nature and possible directions of their interactions have been addressed, either explicitly or implicitly. This way of framing the discussion is but a revisiting of the perennial issue of the nature of the mind-body interactions or the "mind-body problem." The fact that philosophers, psychologists, and scientists have wrestled with this issue for so long, and have made so little satisfactory progress in this area, suggests that we may have been asking the wrong questions or framing our conceptualizations in incomplete ways. It seems time for fresh, more inclusive, and more integrated conceptualizations or models of these topics of study.

Rather than distinguishing body (brain structure and functioning) and mind (as revealed in not only the unusual experiences treated in this chapter but also in every mundane subjective experience), would it not be more satisfactory to speak, instead, of bodymind (or brainmind) as an integrated unit or process which has both materialistic/mechanical substrates and functions and also mentalistic/psychical/spiritual substrates and functions? This would require each side of the perennial debate to stretch their conceptualizations of both brain and mind, to extend each member of this perhaps misleading and only apparent duality, so that the resultant expanded conceptualization (bodymind/brainmind) transcends yet continues to include what had previously been acknowledged. This expanded construct would be given, and would operate on the basis of, the well-recognized physicalistic properties and principles that have been discovered through brain science. The same construct, however, would also be given, and operate on the basis of, other properties and principles discovered through phenomenological, parapsychological, and mystical/spiritual investigations. So, for example, aspects of this construct could respond to sensory information, electromagnetic fields, and so on, in a customary fashion. However, other aspects of this construct could respond to nonlocal events and distant information, and perhaps even to nonsensory, psychical, or spiritual/mystical realms, quite directly and in ways that may not be mediated by familiar physical laws and structures.

This thesis can be stated in several alternative ways: Brain may function as a bioassay for mind; mind may function as a psychoassay for brain; "spirit"

may be real, but of a different sort of reality that can be perceived, under special conditions, by a different faculty of bodymind (one that traditionally has been known as the imagination; see Braud, 2002b). The "perceptions" or prehensions of the imagination may sometimes remain ineffable; at other times, these may be dramatized or personified (through vehicles of thoughts, feelings, and images) so that the referents of these experiences can somehow become available to the experiencer and expressible to others. This new approach could deal adequately with both the familiar facts of brain science and with the experiential realities with which psychical research and the religious, spiritual, and wisdom traditions have concerned themselves.

32. Altered Consciousness Is A Many Splendored Thing

Etzel Cardeña
Thorsen Professor, Department of Psychology, Center for Research on Consciousness and Anomalous Psychology (CERCAP), Lund University, P.O. Box 213 SE-221 00, Lund, Sweden

Abstract

Contrary to the notion that altering our ordinary state of consciousness necessarily produces delusional beliefs and is generally deleterious, various findings in psychology and other disciplines suggest that 1) the ordinary state of consciousness does not provide an accurate mapping of reality and 2) alterations of consciousness can have various positive functions. Among the most important ones are to: a) mildly alter our consciousness to be more effective at our tasks, b) obtain greater pleasure than we can achieve ordinarily, 3) explore nonfactual possibilities that may be actualized through creative ways, 4) enhance the sense of meaningfulness in life and enhance psychological and medical healing, and 5) obtain valid knowledge to comprehend better ourselves and perhaps the universe at large.

KEY WORDS: Altered states of consciousness, epistemology, mysticism.

A discussion of altered states of consciousness (ASC), like one on politics or religion, invites strong emotional reactions. In this paper I question some assumptions about the accuracy and benevolence of the typical ordinary state of consciousness (OSC) while discussing some of the main functions of ASC. Three of the main arguments against ASC are that they: 1) go against what is normal and rational, 2) wreak havoc at personal and social levels, and 3) produce a delusional account of reality, as compared with the OSC. Because we live in a monophasic (rather than polyphasic, see Laughlin, McManus, & d'Aquili, 1992; Whitehead, in press) society that primarily values our ordinary state of consciousness to the detriment of other states, these assumptions are rarely questioned.

1. Ordinary and altered states of consciousness

Regarding the first argument, we are immediately confronted by the relativity of what is "normal" and "rational." As various anthropologists have pointed out, what we consider "normal" in post-industrial, Western societies differs markedly from the experiences of other groups. Turnbull (1993, p. 74) gives a lucid example of how he could not even begin to understand the Mbuti of Congo until he transformed his consciousness to fully participate in their world:

> "But the more it happened the more other things happened. Not only did seemingly incontrovertible oppositions disappear, such as joy and grief, noise and quietness… somehow the differentiation between my senses seemed to disappear and I began touching moonlight, smelling the sound of the songs, hearing the scent of the various kinds of woods blazing away... and seeing the truth, even if I could not understand what I saw."

As to rationality, Richard Shweder (1986) has cogently discussed how holding such ideas as reincarnation, which may at first blush strike the reader as irrational, may be based on a rational consideration of empirical evidence, although parting from different metaphysical axioms than those held by many in the secular West who hold different ones (and by definition axioms are not the result of rational consideration but a-priori assumptions).

As to the second issue, undoubtedly the search for and consequences of ASC can be destructive, as in the personal and social costs of drug addiction, which is why various traditional societies provide training on and ritualize the

use of psychoactive drugs, which then cause no harm, in contrast with what occurs in our midst (Dobkin de Rios, 1984). Let me be clear that despite my cheery title it is not my contention that ASC are necessarily beneficent. Although evidence has accumulated that just having unusual experiences and ASC is not per se a sign of dysfunction (Cardeña, Lynn, & Krippner, 2000; Moreira-Almeida & Cardeña, in press), this does not deny that hellish ASC are also encountered in the ravines of a schizophrenic or otherwise seriously disordered mind (Cardeña, 2011), or that ritually-induced ASC to form in-group cohesion may not be used for horrible purposes as in the Nazi Nuremberg rallies. The other side of the coin, however, is that the vast majority of atrocities have been planned while in an OSC, from decisions to wage unnecessary wars and genocides to the socially accepted mistreatment of non-human sentient beings to save some money.

The final point in this section concerns the presumption that ASC "create phenomenal contents of consciousness that misrepresent or create delusional beliefs of the surrounding world and oneself" and the OSC does not (Kallio & Revonsuo, 2003, pp. 141-142; a re-statement of a position previously advanced by Natsoulas, 1983). This position goes against not only centuries old critiques of naïve realism in both the West and the East, but a vast amount of research on perception, cognition, and personality. For instance, perceptual illusions show that our senses routinely distort stimuli in various ways, physiological habituation evidences that repeated exposure to a stimulus may make it imperceptible, and studies of other species show how limited our perceptual channels are as compared to theirs (Balcombe, 2010). To these we can add research on how the OSC is geared to detect certain aspects of the environment and disregard others (Ornstein, 1986), and on how emotions and cognitions routinely have a self-serving bias and distort how we evaluate and remember events (Greenwald, 1980). Thus, Western and Eastern spiritual ascriptions that state that we perceive the world through a glass darkly or the veil of maya (or illusion) are consistent with psychological and neuroscientific research. As to the argument that evolution should produce beings that do not create delusional beliefs or misrepresentations, research shows that a mere approximation to what may actually be "there" is selected for rather than a resources-taxing very accurate representation (Hoffman, 2009).

Instead of considering ASC as necessarily leading to delusions and

misrepresentations, I concur with Mishara & Schwartz (in press) that ASC barely suspend or disrupt our consensual common sense ways of constructing reality, and that we cannot state a-prior what is the ontological status of these alternatives. A discussion of the main purposes to alter our consciousness constitutes the gist of this paper, inspired by multidisciplinary contributions to the study of ASC (Cardeña & Winkelman, in press a, b).

That most cultures throughout history (around 90%, see Bourguignon, 1973) until very recently have established forms to attain ASC (often during well-developed rituals) suggests that they have considered them positive rather than as the purveyors of misinformation. For example, the phenomenon known as shamanism, found in hunting-gathering societies across the globe, is characterized by the controlled practice of altering the shaman's (and often his or her audience's) state of consciousness or, in less secular terms, experiencing other realities (Cardeña & Krippner, 2010; Winkelman, in press). Eastern spiritual traditions have described and codified meditation techniques that aim to alter one's consciousness in the shortand long-term (Shear, in press), as have performance disciplines (Zarrilli, in press), martial arts, and sexual practices (Maliszewski, Vaughan, Krippner, Holler, & Fracasso, in press).

The West has also had a plethora of techniques to induce ASC, from the use of caves in prehistoric and Greek times, to drugs, dances, mystery rituals, hypnotic and other suggestions, meditative practices, and so on (Cardeña & Alvarado, in press; Sluhovsky, in press; Ustinova, in press). In our times, various groups have continued or modified previous techniques and enlisted technology with the goal of altering consciousness (St John, in press), but we have barely gone beyond the cogitations of Plato on altered consciousness (Cardeña, 2009).

2. Why Do We Seek to Alter Our Consciousness?

A visitor from another planet would surely find it puzzling that humans spend about one third of their lives in sleep states yet pay little attention to them. Besides this inbuilt alteration of consciousness, humans (and other species, see Siegel, 1989) seek to affect their consciousness in other ways. Some psychoactive drugs have been synthesized in the laboratory but non-urbane inhabitants have had at their disposal for millennia compounds with remarkable abilities to produce ASC. For instance, N,Ndimethyltryptamine

(DMT) is found in many plants and animals, and its molecular structure is remarkably similar to that of the neurotransmitter serotonin (Mishor, McKenna, & Callaway, in press). Indeed, the most ubiquitous drug supplier we have is our own nervous system, whose function is based on various neurotransmitters with very similar structures to those of psychoactive drugs (the latter can affect us precisely because they mimic our endogenously produced substances; Presti, in press).

Contrary to what many of us were told about the artificiality of affecting our states of consciousness, it turns out that we have been using all along our biology given resources. But why do we try to alter our state of consciousness? Ludwig (1966) posited that ASC can have healing, social, or epistemological functions. In the remaining of the paper, I will expand that list and discuss how ASC can help us: A) make small adjustments so we can be more effective at our tasks, B) enhance the experience of life, C) explore nonfactual possibilities that may be actualized through creative ways, D) enhance the sense of meaningfulness in life and heal in different ways, and E) obtain alternate epistemological routes to comprehend better ourselves and the universe at large.

A) Making small adjustments in everyday life Because they are taken routinely and produce minor modifications, we generally disregard how we routinely affect our consciousness by using caffeine to make us more alert, chamomile tea to produce a gentle sedative affect, or nicotine as either a stimulant or a relaxant. Feeling low we may choose to initiate an energetic walk or, being tired of thinking about and writing this paper, I may decide to give my mind a break and let a good film director invite me into another reality or try to achieve a flow state (i.e., full immersion in an activity, Csikszentmihalyi, 1988) while playing tennis. I do not claim that these various activities generally bring about ASC (although flow states have a number of commonalities, such as time changes, with more radical alterations of consciousness, Cardeña, 2006), but at the very least they exemplify our propensity to affect our states of consciousness in subtle ways throughout the day.

B) Enhance the experience of life We do not need to embrace hedonism and declare pleasure the only intrinsic good to realize that one of the major joys of life is the experience with which our senses regale us. Throughout our development, however, we substitute more and more the expanded, open

consciousness of the baby and infant for an ego-centered, focused, conceptual mediation of the world (Gopnik, 2009). Although pragmatic in many ways, this form of apprehension superposes conceptual layers on direct, sensuous experience. That many people find something amiss in a low intensity existence is borne by the myriad activities through which they seek to enhance sensuous experiences, from culinary to bungee-jumping adventures. These pale, however, when compared with the re-enchantment of the world which some find in the use of psychedelics or "esoteric" erotic techniques. While the term "hallucinogen" suggests that the main effect of a drug will be some kind of hallucinations, users may specifically look for an enhancement of their sensual experiences (e.g., Tart, 1971), perhaps akin to what some artists experience and seek to convey (Durr, 1970). We may thus induce ASC to become more childlike and immerse us in sounds, tastes, or the skin of the beloved (cf. Granqvist, Reijman, & Cardeña, in press).

Some excerpts from an account by psychologist Stanley Krippner (1970) after ingesting psilocybin will give a taste of what this experience is like:

> "I opened my eyes to find the living room vibrating with brilliant colors… I seemed to be in the middle of a three-dimensional Vermeer painting… I was astounded by the extraordinarily delicious taste and perfection of [an apple]… My exploration of the softness of the sweater and the warmth of her flesh was an ecstatic sensual experience… I was hearing the music as I had never heard it before… Only the sheer beauty of each individual tone mattered. I was listening to music vertically rather than horizontally."

C) Discover novel, creative ways to look at or express reality A recent finding in developmental psychology is that the creation and experience of fantasy during infancy and childhood is not only not opposed to analytical, rational development, but may be necessary to it (cf. Gopnik, 2009). The initial flowing spurts of game and created worlds tend to be overwhelmed later on by pragmatic endeavors, yet during ASC not only can we experience more intensely our sense data but become fully immersed in experiences in which ordinary physical or psychological constraints do not apply, have unusual associations, or try different solutions that could not be implemented during our OSC. It is not surprising that the propensity to easily transit among states of consciousness is positively related to creativity (Hartmann,

1991). Artists (Levy, in press), and writers (Cousins, in press), have explored dreaming, shamanism, meditation, hypnosis, and other ASC to develop their art in various ways or as a source of inspiration. For example, Van Gogh wrote that he would often look at a landscape for hours without a break until he would arrive to a special state of "lucidity," which may partly explain the intensity of his paintings (in Levy, in press).

Some eminent scientists have also linked ASC, brought deliberately or not (Koestler, 1964), with technical invention and scientific breakthrough, as in the case of dreams providing a guide in the work of Loewi, Elias Howe, and others (Krippner & Hughes, 1970). This does not mean, of course, that being in an ASC will ipso facto allow someone to produce a great work of art or have a scientific breakthrough, but that entering an ASC may generate novel ideas, associations, and experiences that may then be developed in that or an OSC.

D) Enhancing the meaningfulness of life/improving medical and psychological health Anomalous experiences overall are experienced as enhancing creativity and the meaning and purpose of life, in contrast with obtaining wealth (Kennedy, Kanthamani, & Palmer, 1994). While it is arguable that near-death-experiences (NDEs) provide evidence for the survival of consciousness after death, they are a primary illustration of how ASC can improve the experients' life. The majority of those having undergone an NDE seem to become more harmonious in the long-term (in the short term they may have to adapt themselves and others to their experience), caring more for others and the environment and being less materialistic and selfcentered (Greyson, 2000). Similarly, an experience with psilocybin in a supervised setting was not only described as extremely meaningful by experients, but made them better people as judged by those close to them (Griffiths, Richards, McCann, & Jesse, 2006).

That a psychoactive drug is not required can be seen in research with very high hypnotizables individuals who reported positive changes after experimental sessions without specific suggestions. Previously they had reported such ongoing experiences as "the overwhelming serenity of it," "all the feelings that are good… There's a bright light, I'm in it… It feels like I've been here before" (Cardeña, 2005, unpublished data). The ultimate ontology of these and other ASC can be contested, but not that they increase the perceived meaning of experients' lives.

Healing is a multivocal concept that includes experiences of health improvement that may or may not be related to actual improvement in health indexes, besides being used to denote finding greater meaning in life irrespective of changes in health. Ever since shamanism have ASC been associated with the ability to induce or experience healing (Winkelman, in press), and often that purported ability has followed real or symbolic injury and illness, as in this fragment of a North American shaman:

> "I was torn and torn… I accepted it all… And then I began to be put back together again… Something was there wasn't there before… it made the whole thing more than it had been… that song gave me new strength and power" (in Halifax, 1979, p. 155).

Accounts of some form of healing after ASC do not occur only in traditional societies as illustrated by an account of an NDE in which after the person experienced "the kind of love that cures, heals, regenerates" his brain tumor disappeared (in Dossey, 2011, p. 59). We require far more systematic research on the connection of ASC and such "spontaneous remissions" (Krippner & Achterberg, 2000). Techniques that can produce alterations in consciousness such as hypnosis and meditation have been found to have a therapeutic effect in a variety of psychological and medical conditions (Horowitz, 2010; Mendoza & Capafons, 2009), but we are still a long way from being able to determine what factors, including possible alterations in consciousness, effect positive outcomes. Mishara and Schwartz (in press) propose that the alternative self-world representations created by ASC may disrupt maladaptive psychobiological patterns and bring about improvement in symptoms or, at least, in the way they are experienced.

E) Provide valid knowledge about reality The final issue goes to the core of what is the most contested issue about ASC, namely whether they can provide alternative and valid knowledge to that offered by our OSC. The import of ASC for ontology, epistemology, and metaphysics has been discussed by thinkers of the stature of Plato and Descartes, and continue to intrigue contemporary philosophers (Windt, in press). Let me start with less controversial claims and then move to more challenging ones.

A mainstream theory of the functions of sleep maintains that by keeping new learning to a minimum during that state we can consolidate and reorganize recently acquired information (Hobson, 1995); this seems to be

the case especially with respect to emotional memories (Wagner, Gais, & Born, 2001). A less investigated purpose for ASC is that they may provide insight into aspects of cognition that generally remain opaque. Besides the insights into one's psyche that various drugs and other forms to alter consciousness may provide, seeking to affect ordinary consciousness through meditation may reduce the effect of perceptual illusions (e.g., Brown, Forte, & Dysart, 1984) and reveal the architecture of cognition (Hunt, 1995). That ASC may provide access to valid information at least with regard to the experient is borne out by a study in which traumatic dreams provided a significant indicator of the extent of the, until then unascertained, heart damage of the dreamer (Smith, 1987).

Yet the most daring claim is that the alternative perspectives about reality engendered by some (by no means all!) ASC is a more real or at least a complementary view than that provided ordinarily by our senses and reason. The clearest instance is the view enunciated by mystics throughout the centuries that we are interconnected within an all-pervading unity (Wulff, 2000). Mystical reports include sensual experiences such as "I was immersed in sweetness words cannot express. I could hear the singing of the planets, and wave after wave of light washed over me… I was the light as well" (in Wulff, 2000, p. 398) or instances of pure awareness: "[In my meditations]I just remain in the Absolute for the entire sitting and nothing else seems to happen, other than the feeling of bliss permeating me completely (in Shear, in press). Regardless of these differences these and other reports imply a general sense of unity with all there is. Serious consideration for this view of reality has come not only from mystics and artists of various stripes but from eminent psychologists and neuroscientists (cf. Cardeña & Winkelman, in press a, b), and quantum physicists such as David Bohm. Just compare Bohm describing his theory of implicate order "We must learn to view everything as part of "Undivided Wholeness in Flowing Movement"… On this stream, one may see an ever-changing pattern of vortices, ripples, waves, splashes, etc., which evidently have no independent existence as such. Rather, they are abstracted from the flowing movement, arising and vanishing in the total process of the flow" (Bohm, 1980, pp. 11, 48), with a fragment from Lord Shelley's poem Adonais:

The One remains, the many change and pass;

Heaven's light forever shines, Earth's shadows fly;
Life, like a dome of many-coloured glass,
Stains the white radiance of Eternity

The growing research database on parapsychological phenomena also suggests that not only do we seem to be affected independently of time and space constraints, but that this happens more often (or at least we become aware that it happens more often) during ASC (Luke, in press).

Thus, not only consciousness as the capacity to have experiences and observe events, but also ASC must be taken into consideration as we ponder the nature of the universe. This suggests that the world is found not only in a grain of sand but in the state of consciousness that intuits that connection.

REFERENCES

Balcombe, J. (2010). Second Nature. The Inner Lives of Animals. New York: Macmillan.

Bohm, D. & Hiley, B. J. (1993). Wholeness and the Implicate Order. London: Routledge & Kegan Paul.

Bourguignon, E. (1973). Religion, Altered States of Consciousness, and Social Change. Columbus: Ohio State University Press.

Brown, D., Forte, M., & Dysart, M. (1984a). Differences in visual sensitivity among mindfulness meditators and non-meditators. Perceptual and Motor Skills, 58, 727– 733.

Cardeña, E. (2005). The phenomenology of deep hypnosis: Quiescent and physically active. International Journal of Clinical & Experimental Hypnosis, 53, 37-59.

Cardeña, E. (2006). Flow and anomalous experiences. Stanford University Nissan Salon, Invited address, March, 2006.

Cardeña, E. (2009). Beyond Plato? Toward a science of alterations of consciousness. In C. A. Roe, W. Kramer, & L. Coly (Eds.). Utrecht II: Charting the Future of Parapsychology (pp. 305-322). New York, NY: Parapsychology Foundation, Inc.

Cardeña, E. (in press). Altered consciousness in emotion and psychopathology. In E. Cardeña, & M. Winkelman (Eds.), Altering Consciousness. A Multidisciplinary Perspective. Volume II. Biology and

Clinical Sciences. Praeger Publishers.

Cardeña, E., & Alvarado, C. (in press). Altered consciousness from the Age of Enlightenment through mid-20th century. In E Cardeña, M Winkelman (Eds.), Altering Consciousness. A Multidisciplinary Perspective. Volume I. History, Culture, and the Humanities. Praeger Publishers.

Cardeña, E., Lynn, S. J., & Krippner, S. (Eds.). (2000). Varieties of Anomalous Experience: Examining the Scientific Evidence. Washington, DC: American Psychological Association.

Cardeña, E., & Winkelman, M. (in press, a). Altering Consciousness. A Multidisciplinary Perspective. Volume I. History, Culture, and the Humanities. Praeger Publishers.

Cardeña, E., & Winkelman, M. (in press, b). Altering Consciousness. A Multidisciplinary Perspective. Volume II. Biology and Clinical Sciences. Praeger Publishers.

Cousins, W. (in press). Colored inklings: Altered states of consciousness and literature. In E Cardeña, M Winkelman (Eds.), Altering Consciousness. A Multidisciplinary Perspective. Volume I. History, Culture, and the Humanities. Praeger Publishers.

Csikszentmihalyi, Mihaly (1988), Optimal experience: Psychological studies of flow in consciousness, Cambridge, NY: Cambridge University Press.

Dobkin de Rios, M. (1984). Hallucinogens: Cross-cultural perspectives. Albuquerque: University of New Mexico Press.

Dossey, L. (2011). Dying to heal: A neglected aspect of NDEs. Explore: The Journal of Science and Healing, 7(2), 59-62.

Durr, R.A. (1970). Poetic vision and the psychedelic experience. New York: Syracuse University Press.

Gopnik, A. (2009). The Philosophical Baby. New York: Farrar, Straus and Giroux. Granqvist, P., Reijman, S., & Cardeña, E. (in press). Altered consciousness and human development. In E Cardeña, M Winkelman (Eds.), Altering Consciousness. A Multidisciplinary Perspective. Volume II. Biology and Clinical Sciences. Praeger Publishers.

Greyson, B. (2000). Near-death experiences. In E. Cardeña, S. J. Lynn, & S. Krippner (Eds.), Varieties of Anomalous Experience: Examining the Scientific Evidence (pp. 315–351). Washington, DC: American Psychological Association.

Griffiths, R. R., Richards, W. A., McCann, U., & Jesse, R. (2006). Psilocybin can occasion mystical-type experiences having substantial and sustained personal meaning and spiritual significance. Psychopharmacology, 187, 268–283.

Halifax, J. (1979). Shamanic Voices: The Shaman as Seer, Poet and Healer. Middlesex, UK: Penguin.

Hartmann, E. (1991). Boundaries of the Mind: A New Psychology of Personality. New York: Basic Books.

Hobson, J. A. (1995). Sleep. New York: Scientific American Library.

Hoffman, D. D. (2009). Nature and consciousness. Mindfield. The Bulletin of the Parapsychological Association, 1(1), 6–7.

Horowitz, S. (2010). Health benefits of meditation: What the newest research shows. Alternative and Complementary Therapies 16(4), 223-228.

Hunt, H. (1995). On the nature of consciousness. New Haven, CT: Yale University Press.

Kallio, S., & Revonsuo, A. (2003). Hypnotic phenomena and altered states of consciousness: A multilevel framework of description and explanation. Contemporary Hypnosis, 20, 111–164.

Kennedy, J. E., Kanthamani, H., & Palmer, J. (1994). Psychic and spiritual experiences, health, well-being, and meaning in life. Journal of Parapsychology, 58, 353-383.

Koestler, A. (1964). The act of creation. Middlesex, UK: Penguin.

Krippner, S. (1970). An adventure in psilocybin. In B. Aaronson & H. Osmond (Eds.), Psychedelics. New York: Anchor Books.

Krippner, S., & Achterberg, J. (2000). Anomalous healing experiences. In E. Cardeña, S. J. Lynn, & S. Krippner (Eds.), Varieties of anomalous experience: Examining the scientific evidence (pp. 353–395). Washington, DC: American Psychological Association.

Krippner, S., & Hughes, W. (1970). Dreams and human potential. Journal of Humanistic Psychology, 10, 1-20.

Laughlin, C. D., McManus, J., & d'Aquili, E. G. (1992). Brain, Symbol and Experience: Toward a Neurophenomenology of Human Consciousness. New York: Columbia University Press.

Levy, M. (in press). Altered consciousness and modern art. In E Cardeña, M Winkelman (Eds.), Altering Consciousness. A Multidisciplinary Perspective. Volume I. History, Culture, and the Humanities. Praeger

Publishers.

Ludwig, A. M. (1966). Altered states of consciousness. Archives of General Psychiatry, 15, 225–234.

Luke, D. (in press). Anomalous phenomena, psi, and altered consciousness. In E Cardeña, M Winkelman (Eds.), Altering Consciousness. A Multidisciplinary Perspective. Volume II. Biology and Clinical Sciences. Praeger Publishers.

Maliszewski, M., Vaughan, B., Krippner, S., Holler, G., & Fracasso, C. (in press). Altering consciousness through sexual activity. In E Cardeña, M Winkelman (Eds.), Altering Consciousness. A Multidisciplinary Perspective. Volume II. Biology and Clinical Sciences. Praeger Publishers.

Mendoza, M. E., & Capafons, A. (2009). Efficacy of clinical hypnosis: A summary of its empirical evidence. Papeles del Psicólogo, 38, 98-116.

Mishara, A. L., & Schwartz, M. A. (in press). Altered states of consciousness as paradoxically healing: An embodied social neuroscience perspective. In E Cardeña, M Winkelman (Eds.), Altering Consciousness. A Multidisciplinary Perspective. Volume II. Biology and Clinical Sciences. Praeger Publishers.

Mishor, Z., McKenna, D. J., & Callaway, J. C. (in press). DMT and human consciousness. In E Cardeña, M Winkelman (Eds.), Altering Consciousness. A Multidisciplinary Perspective. Volume II. Biology and Clinical Sciences. Praeger Publishers.

Moreira-Almeida, A., & Cardeña, E. (in press). Differential diagnosis between nonpathological psychotic and spiritual experiences and mental disorders: A contribution from Latin American studies to the ICD-11. Revista Brasileira de Psiquiatria Natsoulas, T. (1983). Concepts of consciousness. Journal of Mind and Behavior, 4, 13–59.

Ornstein, R. (1986). The psychology of consciousness (rev. ed.). New York: Penguin.

Presti, D. E. (in press). Neurochemistry and altered consciousness. In E Cardeña, M Winkelman (Eds.), Altering Consciousness. A Multidisciplinary Perspective. Volume II. Biology and Clinical Sciences. Praeger Publishers.

Shear. J. (in press). Eastern approaches to altered states of consciousness. In E Cardeña, M Winkelman (Eds.), Altering Consciousness. A Multidisciplinary Perspective. Volume I. History, Culture, and the Humanities. Praeger Publishers.

Shweder, R.A. (1986). Divergent rationalities. In D.W. Fiske & R.A. Shweder (Eds.), Metatheory in social science: Pluralisms and subjectivites (pp. 163-196). Chicago: University of Chicago Press.

Siegel, R. K. (1989). Intoxication. New York: E. P. Dutton.

Sluhovsky, M. (in press). Spirit possession and other alterations of consciousness in the Christian Western tradition. In E Cardeña, M Winkelman (Eds.), Altering Consciousness. A Multidisciplinary Perspective. Volume I. History, Culture, and the Humanities. Praeger Publishers.

Smith, R. C. (1987). Do dreams reflect a biological state? Journal of Nervous and Mental Disease, 147, 587-604.

St John, G. (in press). Spiritual technologies and altering consciousness and altering consciousness in contemporary counterculture. In E Cardeña, M Winkelman (Eds.), Altering Consciousness. A Multidisciplinary Perspective. Volume I. History, Culture, and the Humanities. Praeger Publishers.

Ustinova, Y. (in press). Consciousness alteration practices in the West from Prehistory to Late Antiquity. In E Cardeña, M Winkelman (Eds.), Altering Consciousness. A Multidisciplinary Perspective. Volume I. History, Culture, and the Humanities. Praeger Publishers.

Tart, C. T. (1971). On Being Stoned: A Psychological Study of Marijuana Intoxication. Palo Alto, CA: Science and Behavior Books.

Turnbull, C. (1993). Liminality: A synthesis of subjective and objective experience. In: R. Schechner & W. Appel (Eds). By means of performance (pp. 50-81). Cambridge: Cambridge University Press.

Wagner, U., Gais, S., & Born, J. (2001). Emotional memory formation is enhanced across sleep intervals with high amounts of rapid eye movement sleep. Learning and Memory, 8, 112-119.

Whitehead, C. (in press). Altered consciousness in society. In E Cardeña, M Winkelman (Eds.), Altering Consciousness. A Multidisciplinary Perspective. Volume II. Biology and Clinical Sciences. Praeger Publishers; in press.

Windt, J. M. (in press). Altered consciousness in philosophy. In E Cardeña, M Winkelman (Eds.), Altering Consciousness. A Multidisciplinary Perspective. Volume I. History, Culture, and the Humanities. Praeger Publishers.

Winkelman, M. (in press). Shamanism and the alteration of consciousness. In E Cardeña, M Winkelman (Eds.), Altering Consciousness.

A Multidisciplinary Perspective. Volume II. Biology and Clinical Sciences. Praeger Publishers.

Wulff, D. M. (2000). Mystical experiences. In E. Cardeña, S. J. Lynn, & S. Krippner (Eds.), Varieties of Anomalous Experience: Examining the Scientific Evidence (pp. 397–440). Washington, DC: American Psychological Association.

Zarrilli, P. B. (in press). Altered consciousness in performance. West and East. In E Cardeña, M Winkelman (Eds.), Altering Consciousness. A Multidisciplinary Perspective. Volume II. Biology and Clinical Sciences. Praeger Publishers.

*****

****

***

VI: QUANTUM CONSCIOUSNESS OF GOD AND REALITY

*****

****

***

33. How Consciousness Becomes the Physical Universe

Menas Kafatos[1], Rudolph E. Tanzi[2], Deepak Chopra[3]
[1]Fletcher Jones Endowed Professor in Computational Physics, Schmid College of Science, Chapman University, One University Dr. Orange,

California, 92866,
[2]Joseph P. and Rose F. Kennedy Professor of Neurology, Harvard Medical School Genetics and Aging Research Unit Massachusetts General Hospital/Harvard Medical School 114 16th Street Charlestown, MA 02129
[3]The Chopra Center for Wellbeing, Carlsbad, CA 92009

Abstract

Issues related to consciousness in general and human mental processes in particular remain the most difficult problem in science. Progress has been made through the development of quantum theory, which, unlike classical physics, assigns a fundamental role to the act of observation. To arrive at the most critical aspects of consciousness, such as its characteristics and whether it plays an active role in the universe requires us to follow hopeful developments in the intersection of quantum theory, biology, neuroscience and the philosophy of mind. Developments in quantum theory aiming to unify all physical processes have opened the door to a profoundly new vision of the cosmos, where observer, observed, and the act of observation are interlocked. This hints at a science of wholeness, going beyond the purely physical emphasis of current science. Studying the universe as a mechanical conglomerate of parts will not solve the problem of consciousness, because in the quantum view, the parts cease to be measureable distinct entities. The interconnectedness of everything is particularly evident in the non-local interactions of the quantum universe. As such, the very large and the very small are also interconnected. Consciousness and matter are not fundamentally distinct but rather are two complementary aspects of one reality, embracing the micro and macro worlds. This approach of starting from wholeness reveals a practical blueprint for addressing consciousness in more scientific terms.

1. Introduction

We realize that the title of our paper is provocative. It is aimed at providing a theory of how the physical universe and conscious observers can be integrated. We will argue that the current state of affairs in addressing the multifaceted issue of consciousness requires such a theory if science is to

evolve and encompass the phenomenon of consciousness. Traditionally, the underlying problem of consciousness has been excluded from science, on one of two grounds. Either it is taken as a given that it has no effect on experimental data, or if consciousness must be addressed, it is considered subjective and therefore unreliable as part of the scientific method. Therefore, our challenge is to include consciousness while still remaining within the methods of science.

Our starting point is physics, which recognizes three broad approaches to studying the physical universe: classical, relativistic, and quantum. Classical Newtonian physics is suitable for most everyday applications, yet its epistemology (method of acquiring knowledge) is limited -it does not apply at the microscopic level and cannot be used for many cosmic processes. Between them, general relativity applies at the large scale of the universe and quantum theory at the microcosmic level. Despite all the attempts to unify general relativity with quantum theory, the goal is still unreached. Of the three broad approaches, quantum theory has clearly opened the door to the issue of consciousness in the measurement process, while relativity admits that observations from different moving frames would yield different values of quantities. Many of the early founders of quantum mechanics held the view that the participatory role of observation is fundamental and the underlying "stuff" of the cosmos is processes rather than the construct of some constant, underlying material substance.

However, quantum theory does not say anything specific about the nature of consciousness -the whole issue is clouded by basic uncertainty over even how to define consciousness. A firm grasp of human mental processes still remains very elusive. We believe that this indicates a deeper problem which scientists in general are reluctant to address: objective science is based on the dichotomy between subject and object; it rests on the implicit assumption that Nature can be studied ad infinitum as an external objective reality. The role of the observer is, at best, secondary, if not entirely irrelevant.

2. Consciousness and Quantum Theory

In our view, it may well be that the subject-object dichotomy is false to begin with and that consciousness is primary in the cosmos, not just an epiphenomenon of physical processes in a nervous system. Accepting this assumption would

turn an exceedingly difficult problem into a very simple one. We will sidestep any precise definition of consciousness, limiting ourselves for now to willful actions on the part of the observer. These actions, of course, are the outcome of specific choices in the mind of the observer. Although some mental actions could be automated, at some point the will of conscious observer(s) sets the whole mechanical aspects of observation in motion.

The issue of observation in QM is central, in the sense that objective reality cannot be disentangled from the act of observation, as the Copenhagen Interpretation (CI) clearly states (cf. Kafatos & Nadeau 2000; Kafatos 2009; Nadeau and Kafatos, 1999; Stapp 1979; Stapp 2004; Stapp 2007). In the words of John A. Wheeler (1981), we live in an observer-participatory universe. The vast majority of today's practicing physicists follow CI's practical prescriptions for quantum phenomena, while still clinging to classical beliefs in observer-independent local, external reality (Kafatos and Nadeau 2000). There is a critical gap between practice and underlying theory. In his Nobel Prize speech of 1932, Werner Heisenberg concluded that the atom "has no immediate and direct physical properties at all." If the universe's basic building block isn't physical, then the same must hold true in some way for the whole. The universe was doing a vanishing act in Heisenberg's day, and it certainly hasn't become more solid since.

This discrepancy between practice and theory must be confronted, because the consequences for the nature of reality are far-reaching (Kafatos and Nadeau, 2000). An impressive body of evidence has been building to suggest that reality is non-local and undivided. Non-locality is already a basic fact of nature, first implied by the Einstein-Podolsky-Rosen thought experiment (EPR, 1935), despite the original intent to refute it, and later explicitly formulated in Bell's Theorem (Bell, 1964) and its relationship to EPR – for further developments, see also experiments which favor QM over local realism, e.g. Aspect, Grangier, and Roger, 1982; Tittel, Brendel, Zbinden & Gisin, 1998. One can also cite the Aharonov-Bohm (1959) effect, and numerous other quantum phenomena.

Moreover, this is a reality where the mindful acts of observation play a crucial role at every level. Heisenberg again: "The atoms or elementary particles themselves . . . form a world of potentialities or possibilities rather than one of things or facts." He was led to a radical conclusion that underlies our own view in this paper: "What we observe is not nature itself, but nature

exposed to our method of questioning." Reality, it seems, shifts according to the observer's conscious intent. There is no doubt that the original CI was subjective (Stapp, 2007). However, as Bohr (1934) and Heisenberg (1958) as well as the other developers of CI stated on many occasions, the view that emerged can be summarized as, "the purpose is not to disclose the real essence of phenomena but only to track down… relations between the multifold aspects of our experience" (Bohr, 1934). Stapp (2007) restates this view as "quantum theory is basically about relationships among conscious human experiences" (Stapp 2007). Einstein fought against what he considered the positivistic attitude of CI, which he took as equivalent to Berkeley's dictum to be is to be perceived (Einstein 1951), but he nevertheless admitted that QM is the only successful theory we have that describes our experiences of phenomena in the microcosm.

Quantum theory is not about the nature of reality, even though quantum physicists act as if that is the case. To escape philosophical complications, the original CI was pragmatic: it concerned itself with the epistemology of quantum world (how we experience quantum phenomena), leaving aside ontological questions about the ultimate nature of reality (Kafatos and Nadeau, 2000). The practical bent of CI should be kept in mind, particularly as there is a tendency on the part of many good physicists to slip back into issues that cannot be tested and therefore run counter to the basic tenets of scientific methodology.

To put specifics into the revised or extended CI, Stapp (2007) discusses John von Neumann's different types of processes. The quantum formalism eloquently formalized by von Neumann requires first the acquisition of knowledge about a quantum system (or probing action) as well as a mathematical formalism to describe the evolution of the system to a later time (usually the Schrödinger equation). There are two more processes that Stapp describes: one, according to statistical choices prescribed by QM, yields a specific outcome (or an intervention, a "choice on the part of nature" in Dirac's words); the second, which is primary, precededing even the acquisition of knowledge, involves a "free choice" on the part of the observer. This selection process is not and cannot be described by QM, or for that matter, from any "physically described part of reality" (Stapp, 2007).

These extensions (or clarifications) of the original orthodox CI yield a profoundly different way of looking at the physical universe and our role in it

(Kafatos and Nadeau, 2000). Quantum theory today encompasses the interplay of the observer's free choices and nature's "choices" as to what constitute actual outcomes. This dance between the observer and nature gives practical meaning to the concept of the participatory role of the observer. (Henceforth we won't distinguish between the original CI and as it was extended by von Neumann—referring to both as orthodox quantum theory.) As Bohr (1958) emphasized, "freedom of experimentation" opens the floodgates of free will on the part of the observer. Nature responds in the statistical ways described by quantum formalism.

Kafatos and Nadeau (2000) and Nadeau and Kafatos (1999) give extended arguments about these metaphysically-based views of nature. CI points to the limits of physical theories, including itself. If any capriciousness is to be found, it should not be assigned to nature, rather to our mindset about how nature ought to work. As we shall see, there are credible ways to build on quantum formalism and what it suggests about the role of consciousness.

3. Quantum Mechanics and the Brain

It is essential that we avoid the mistake of rooting a physical universe in the physical brain, for both are equally rooted in the non-physical. For practical purposes, this means that the brain must acquire quantum status, just as the atoms that make it up have. The standard assumption in neuroscience is that consciousness is a byproduct of the operation of the human brain. The multitude of processes occurring in the brain covers a vast range of spatio-temporal domains, from the nanoscale to the everyday human scale (e.g. Bernroider and Roy, 2004). Even though they differ on certain issues, a number of scientists accept the applicability of QM at some scales in the brain (cf. Kafatos 2009).

For example, Penrose (1989, 1994) and Hameroff and Penrose (1996) postulate collapses occurring in microtubules induced by quantum gravity. In their view, quantum coherence operates across the entire brain. Stapp (2007) prefers a set of different classical brains that evolve according to the rules of QM, in accordance with the uncertainty principle. He contends that bringing in (the still not developed) quantum gravity needlessly complicates the picture.

In order for an integrative theory to emerge, the next step is to connect the quantum level of activity with higher levels. As a specific example of

applying quantum-like processes at mesoscale levels, Roy and Kafatos (1999b) have examined the response and percept domains in the cerebellum. They have built a case that complementarity or quantum-like effects may be operating in brain processes. As is well known, complementarity is a cornerstone of orthodox quantum theory, primarily developed by Niels Bohr. Roy and Kafatos imagine a measurement process with a device that selects only one of the eigenstates of the observable A and rejects all others. This is what is meant by selective measurement in quantum mechanics. It is also called filtration because only one of the eigenstates filters through the process. In attempting to describe both motor function and cognitive activities, Roy and Kafatos (1999a) use statistical distance in setting up a formal Hilbert-space description in the brain, which illustrates our view that quantum formalism may be introduced for brain dynamics.

It is conceivable that the overall biological structures of the brain may require global relationships, which come down processes to global complementarity—every single process is subordinated to the whole. Not just single neurons but massive clusters and networks communicate all but instantaneously. One must also account for the extreme efficiency with which biological organisms operate in a holistic manner, which may only be possible by the use of quantum mechanical formalisms at biological, and neurophysiological relevant scales (cf. Frohlich, 1983; Roy and Kafatos, 2004; Bernroider and Roy, 2005; Davies, 2004, 2005; Stapp, 2004; Hameroff et. al., 2002; Hagan et. al., 2002; Hammeroff and Tuszynski, 2003; Mesquita et. al., 2005; Hunter, 2006; Ceballos et al., 2007).

Stepping into the quantum world doesn't produce easy agreement, naturally. The issue of decoherence (whereby the collapse of the wave function brings a quantum system into relationship with the macro world of large-scale objects and events) is often brought up in arguing against relevant quantum processes in the brain. However, neuronal decoherence processes have only been calculated while assuming that ions, such as K+, are undergoing quantum Brownian motion (e.g. Tegmark, 2000). As such, arguments about decoherence (Tegmark, 2000) assume that the system in question is in thermal equilibrium with its environment, which is not typically the case for bio-molecular dynamics (e.g. Frohlich, 1986; Pokony and Wu, 1998; Mesquita et. al., 2005).

In fact, quantum states can be pumped like a laser, as Frohlich originally

proposed for biomolecules (applicable to membrane proteins, and tubulins in microtubules, see also work by Anirban, present volume). Also, experiments and theoretical work indicate that the ions themselves do not move freely within the ion-channel filter, but rather their states are pre-selected, leading to possible protection of quantum coherence within the ion channel for a time scale on the order of 10-3 seconds at 300K, ~ time scale of ion-channel opening and closing (e.g. Bernroider and Roy, 2005). Similar timescales apply to microtubular structures as pointed out by Hameroff and his co-workers. Moreover, progress in the last several years in high-resolution atomic X-ray spectroscopy from MacKinnon's group (Jang et al. 2003) and molecular dynamics simulations (cf. Monroe 2002) have shown that the molecular organization in ion channels allows for "pre-organized" correlations, or ion trappings within the selectivity filter of K+ channels. This occurs with five sets of four carbonyl oxygens acting as filters with the K+ ion, bound by eight oxygens, coordinated electrostatic interactions (Bernroider and Roy 2005). Therefore, quantum entangled states of between two subsystems of the channel filter result.

Beyond the brain, evidence has mounted for quantum coherence in biological systems at high temperatures, whereas in the past coherence was thought to apply to systems near absolute zero. For proteins supporting photosynthesis (Engel, et.al., 2007), solar photons on plant cells are converted to quantum electron states which propagate or travel through the relevant protein by all possible quantum paths, in reaching the part of the cell needed for conversion of energy to chemical energy. As such, new quantum ideas and laboratory evidence applicable to the fields of molecular cell biology and biophysics will have a profound impact in modeling and understanding the process of coherence within neuro-molecular systems.

4. Bridging the Gap: A Consciousness Model

Our purpose here is not to settle these technical issues – or the many others that have arisen as theorists attempt to link quantum processes to the field of biology – but to propose that technical considerations are secondary. What is primary is to have a reliable model against which experiments can offer challenges. Such a model isn't available as long as we fail to account for the disappearance of the material universe implied by quantum theory. This disappearance is real. There is at bottom no strictly mechanistic, physical

foundation for the cosmos. The situation is far more radical than most practicing scientists suppose. Whatever is the fundamental source of creation, it itself must be uncreated. Otherwise, there is a hidden creator lying in the background, and then we must ask who or what created that.

What does it mean to be uncreated? The source of reality must be self-sufficient, capable of engendering complex systems on the micro and macro scale, self-regulating, and holistic. Nothing can exist outside its influence. Ultimately, the uncreated source must also turn into the physical universe, not simply oversee it as God or the gods do in conventional religion. We feel that only consciousness fits the bill, for as a prima facie truth, no experience takes place outside consciousness, which means that if there is a reality existing beyond our awareness (counting mathematics and the laws of physics as 1 part of our conscious experience), we will never be able to know it. The fact that consciousness is inseparable from cognition, perception, observation, and measurement is undeniable; therefore, this is the starting point for new insights into the nature of reality.

What is the nature of consciousness in our model? We take it as a field phenomenon, analogous to but precededing the quantum field. This field is characterized by generalized principles already described by quantum physics: complementarity, non-locality, scale-invariance and undivided wholeness. But there is a radical difference between this field and all others: we cannot define it from the outside. To extend Wheeler's reasoning, consciousness includes us human observers. We are part of a feedback loop that links our conscious acts to the conscious response of the field. In keeping with Heisenberg's implication, the universe presents the face that the observer is looking for, and when she looks for a different face, the universe changes its mask.

Consciousness includes human mental processes, but it is not just a human attribute. Existing outside space and time, it was "there" "before" those two words had any meaning. In essence, space and time are conceptual artifacts that sprang from primordial consciousness. The reason that the human mind meshes with nature, mathematics, and the fundamental forces described by physics, is no accident: we mesh because we are a product of the same conceptual expansion by which primordial consciousness turned into the physical world. The difficulty with using basic terms like "concept" and "physical" is that we are accustomed to setting mind apart from matter;

therefore, thinking about an atom isn't the same as an atom. Ideas are not substances. But if elementary particles and all matter made of them aren't substances, either, the playing field has been leveled. Quantum theory gives us a model that applies everywhere, not just at the micro level. The real question, then, isn't how to salvage our everyday perception of a solid, tangible world but how to explore the mysterious edge where micro processes are transformed into macro processes, in other words, how Nature gets from microcosm to macrocosm. There, where consciousness acquires the nature of a substance, we must learn how to unify two apparent realities into one. We can begin to tear down walls, integrating objects, events, perceptions, thoughts, and mathematics under the same tent: all can be traced back to the same source.

Physics can serve a pivotal role in transitioning to this new model, because the entire biosphere operates under the same generalized principles we described from the quantum perspective, as does the universe itself. This simple unifying approach must be taken, we realize, as a basic ontological assumption, since it cannot be proven in an objective sense. We cannot extract consciousness from the physical universe, despite the fervent hope of materialists and reductionists. They are forced into a logical paradox, in fact, for either the molecules that make up the brain are inherently conscious (a conclusion to be abhorred in materialism), or a process must be located and described by which those molecules invent consciousness -such a process has not and never will be specified. It amounts to saying that table salt, once it enters the body, finds a way to dissolve in the blood, enter the brain, and in so doing learns to think, feel, and reason.

Our approach, positing consciousness as more fundamental than anything physical, is the most reasonable alternative: Trying to account for mind as arising from physical systems in the end leads (at best) to a claim that mathematics is the underlying "stuff" of the universe (or many universes, if you are of that persuasion). No one from any quarter is proposing a workable material substratum to the universe; therefore, it seems untenable to mount a rearguard defense for materialism itself. As we foresee it, the future development of science will still retain the objectivity of present-day science in a more sophisticated and evolved form. An evolved theory of the role of the observer will be generalized to include physical, biological, and most importantly, awareness aspects of existence. In that sense, we believe the

ontology of science will be undivided wholeness at every level. Rather than addressing consciousness from the outside and trying to devise a theory of everything on that basis, a successful Theory Of Everything (TOE) will emerge by taking wholeness as the starting point and fitting the parts into it rather than vice versa. Obviously any TOE must include consciousness as an aspect of "everything," but just as obviously current attempts at a TOE ignore this and have inevitably fallen into ontological traps.

The time has come to escape those traps. An integrated approach will one day prevail. When it does, science will become much stronger and develop to the next levels of understanding Nature, to everyone's lasting benefit.

References

Aharonov, Y., and Bohm, D. (1959) Significance of Electromagnetic Potentials in the Quantum Theory, Phys. Rev., 115, 485-491.

Aspect, A., Grangier, P. and Roger, G. (1982) Experimental Realization of Einstein-Podolsky-Rosen-Bohm Gedankenexperiment: A New Violation of Bell's Inequalities, Phys. Rev. Lett., 49, 91-94.

Bell, J.S. (1964) On the Einstein-Podolsky-Rosen paradox, Physics, 1, 195.

Bernroider, G. and Roy, S. (2004) Quantum-classical correspondence in the brain: Scaling, action distances and predictability behind neural signals. FORMA, 19, 55–68.

Bernroider, G. and Roy, S. (2005) Quantum entanglement of K+ ions, multiple channel states, and the role of noise in the brain. In: Fluctuations and Noise in Biological, Biophysical, and Biomedical Systems III, Stocks, Nigel G.; Abbott, Derek; Morse, Robert P. (Eds.), Proceedings of the SPIE, Volume 5841-29, pp. 205-214.

Bohr, N. (1934) Atomic Theory and the Description of Nature, Cambridge, Cambridge University Press. Bohr, N. (1958) Atomic Physics and Human Knowledge, New York: Wiley.

Ceballos, R., Kafatos, M., Roy, S., and Yang, S., (2007) Quantum mechanical implications for the mind-body issues, Quantum Mind 2007, G. Bemoider (ed) Univ. Salzburg, July, 2007.

Davies, P. (2004) Does Quantum Mechanics play a non-trivial role in Life? BioSystems, 78, 69–79.

Davies, P. (2005) A Quantum Recipe for Life, Nature, 437, 819.

Einstein, A. (1951) In: Albert Einstein: Philosopher-Physicist, P.A. Schilpp (Ed.) New York, Tudor.

Einstein, A., Podolsky, B., and Rosen, N. (1935) Can Quantum-Mechanical Description of Physical Reality Be Considered Complete?, Phys. Rev., 47, 777-780.

Engel, G.S., Calhoun, T.R., Read, E.L., Ahn, T.K., Mancal, T., Cheng, Y.C., Blankenship, R.E., and Fleming, G.R. (2007) Evidence for wavelike energy transfer through quantum coherence in photosynthetic systems, Nature, 446, 782-786.

Fröhlich, H. (1983) Coherence in Biology, In: Coherent Excitations in Biological Systems, Fröhlich, H. and Kremer, F. (Eds.), Berlin, Springer-Verlag, pp. 1-5.

Fröhlich, H. (1986) In: Modern Bioelectrochemistry, F. Gutman and H. Keyzer (Eds.) Springer-Verlag, New York.

Hagan, S., Hameroff, SR., and Tuszynski, JA. (2002) Quantum computation in brain microtubules: Decoherence and biological feasibility, Physical Review E., 65(6), Art. No. 061901 Part 1 June.

Hameroff, S. and Penrose, R. (1996) Conscious Events as Orchestrated Space-Time Selections, Journal of Consciousness Studies, Vol 3, No. 1, 36-53.

Hameroff, S. and Tuszynski, J. (2003) Search for quantum and classical modes of information processing in microtubules: Implications for the living state, In: Bioenergetic organization in living systems,Eds. Franco Mucumeci, Mae-Wan Ho, World Scientific, Singapore.

Hameroff, S., Nip, A., Porter, M. and Tuszynski, J. (2002) Conduction pathways in microtubules, biological quantum computation, and consciousness, Biosystems, 64(1-3), 149-168.

Heisenberg, W. (1958) Physics and Philosophy, New York, Harper.

Hunter, P. (2006) A quantum leap in biology. One inscrutable field helps another, as quantum physics unravels consciousness, EMBO Rep., October, 7(10), 971–974.

Jiang, Y.A., Lee, A., Chen, J., Ruta, V., Cadene, M., Chait, B.T., and MacKinnon, R. (2003) X-ray structure of a voltage-dependent K+ channel, Nature, 423, 33-41.

Kafatos, M. and Nadeau, R. (1990; 2000). The Conscious Universe: Parts and Wholes in Physical Reality, New York: Springer-Verlag.

Kafatos, M. (2009) Cosmos and Quantum: Frontiers for the Future, Journal of Cosmology, 3, 511-528.

Mesquita, M.V., Vasconcellos, A.R., Luzzi, R., and Mascarenhas, S. (2005) Large-scale Quantum Effects in Biological Systems, Int. Journal of Quantum Chemistry, 102, 1116–1130.

Monroe, C. (2002) Quantum information processing with atoms and photons, Nature, 416, 238-246.

Nadeau, R., and Kafatos, M. (1999) The Non-local Universe: The New Physics and Matters of the Mind, Oxford, Oxford University Press.

Penrose, R. (1989) The Emperor's New Mind, Oxford University Press, Oxford, England. Penrose, R. (1994) Shadows of the Mind, Oxford University Press, Oxford, England.

Pokorny, J., and Wu, T.M. (1998) Biophysical Aspects of Coherence and Biological Order, Springer, New York.

Rosa, L.P., and Faber, J. (2004) Quantum models of the mind: Are they compatible with environment decoherence? Phys. Rev. E, 70, 031902.

Roy S., and Kafatos, M. (1999a) Complemetarity Principle and Cognition Process, Physics Essays, 12, 662-668.

Roy, S., and Kafatos, M., (1999b) Bell-type Correlations and Large Scale Structure of the Universe, In: Instantaneous Action at a Distance in Modern Physics: Pro and Contra, A. E. Chubykalo, V. Pope, & R. Smirnov-Rueda (Eds.), New York: Nova Science Publishers.

Roy, S., and Kafatos, M. (2004) Quantum processes and functional geometry: new perspectives in brain dynamics. FORMA, 19, 69.

Stapp, H.P. (1979) Whiteheadian Approach to Quantum Theory and the Generalized Bell's Theorem, Found. of Physics, 9, 1-25.

Stapp, H. P. (2004) Mind, Matter and Quantum Mechanics (2nd edition), Heidelberg: Springer-Verlag.

Stapp, H.P. (2007) The Mindful Universe: Quantum Mechanics and the Participating Observer, Heidelberg: Springer-Verlag.

Tegmark, M. (2000) Importance of quantum decoherence in brain processes, Phys Rev E Stat Phys Plasmas Fluids Relat Interdiscip Topics, 2000 Apr, 61(4 Pt B), 4194-206.

Tittel, W., Brendel, J., Zbinden, H. and Gisin, N. (1998) Violation of Bell Inequalities by Photons More Than 10km Apart, Phys. Rev. Lett., 81, 3563-3566.

Wheeler, J.A. (1981) Beyond the Black Hole, In: Some Strangeness in the Proportion, H. Woolf (Ed.), Reading, Addison-Wesley Publishing Co.

34. Perceived Reality, Quantum Mechanics, and Consciousness

Subhash Kak[1], Deepak Chopra[2], and Menas Kafatos[3]
[1]Oklahoma State University, Stillwater, OK 74078
[2]Chopra Foundation, 2013 Costa Del Mar Road, Carlsbad, CA 92009
[3]Chapman University, Orange, CA 92866

Abstract:

Our sense of reality is different from its mathematical basis as given by physical theories. Although nature at its deepest level is quantum mechanical and nonlocal, it appears to our minds in everyday experience as local and classical. Since the same laws should govern all phenomena, we propose this difference in the nature of perceived reality is due to the principle of veiled nonlocality that is associated with consciousness. Veiled nonlocality allows consciousness to operate and present what we experience as objective reality. In other words, this principle allows us to consider consciousness indirectly, in terms of how consciousness operates. We consider different theoretical models commonly used in physics and neuroscience to describe veiled nonlocality. Furthermore, if consciousness as an entity leaves a physical trace, then laboratory searches for such a trace should be sought for in nonlocality, where probabilities do not conform to local expectations.

Keywords: quantum physics, neuroscience, nonlocality, mental time travel, time

Introduction

Our perceived reality is classical, that is it consists of material objects and their fields. On the other hand, reality at the quantum level is different in as much as it is nonlocal, which implies that objects are superpositions of other entities and, therefore, their underlying structure is wave-like, that is it is smeared out. This discrepancy shows up in the framework of quantum theory itself because the wavefunction unfolds in a deterministic way excepting

when it is observed which act causes it to become localized.

The fact that the wavefunction of the system collapses upon observation suggests that we should ask whether it fundamentally represents interaction of consciousness with matter. In reality this question is meaningful only if we are able to define consciousness objectively. Since consciousness is not a thing or an external object, its postulated interaction with matter becomes paradoxical. If we rephrased our question we could ask where our personal self is located and if it is just some neural structure that exists in the classical world, why is it that its activity (observation) collapses the wavefunction?

The human observer interacts with the quantum system through apparatus devised by him and, therefore, the actual interaction is between physical systems. If the human were directly observing the system, then also the interaction is within the human brain that consists of various neural structures. The observation is associated with a time element since the apparatus must first be prepared and then examined after the interaction with the quantum system has occurred. The observer's self-consciousness is also the product of life experience, and therefore the variable of time plays a central role in it.

Neuroscience, which considers brain states in terms of electrical and chemical activity in the interconnection of the neurons, that somehow gives rise to awareness, cannot explain where the aware self is located. Since each neuron can only carry a small amount of information, no specific neuron can be the location of the self. On the other hand, if the self is distributed over a large area of the brain, what is it that binds this area together? Furthermore, since we have different inner senses of self in different states of mind, are these based on recruitment of different set of neurons, and why is it that behind each such sense of selfhood, ostensibly associated with different parts of the brain, is the certitude that it corresponds to the same individual? What integrates all these different senses into one coherent and persisting sense of self? Behind these questions lie a whole set of complementarities. Thus in some contexts it is appropriate to view the self as located at some point in the brain, whereas in other contexts it is distributed all over the body.

The question whether mental states are governed by quantum laws is answered in the affirmative by those who accept a quantum basis of mind (von Neumann, 1932/1955; Wigner, 1983; Penrose, 1994; Nadeau and Kafatos, 1999; Roy and Kafatos, 2004; Hameroff and Penrose, 2003; Stapp,

2003; Freeman and Vitiello, 2006). Recent findings in support of quantum models for biology (e.g., Lambert et al., 2013) lend additional support to this position. We add a point of caution here: mind as a random quantum machine as suggested by some theories may be an advance but not the complete picture since it will not be able to account for the individual's freedom and agency; and it cannot imply an objective reality independent of observation.

The question related to the limitations on what can be known by the mind has a logical component related to Gödel's Incompleteness Theorem and logical paradoxes (Davis, 1965), which can also apply to limits of knowing in physics and biology (Herrnstein, 1985; Grandpierre and Kafatos, 2012; Kak, 2012; Buser et al., 2013).

In this article, we focus on the relationship between reality and our conceptions of it as mediated by consciousness. This mediation may be seen through the lenses of neuroscience and physics. We first show how the mind constructs reality; later we discuss how the nonlocality inherent in quantum theory and, therefore, in physical process, is veiled by consciousness so that it appears to be local (Kak, 2014; Kafatos and Kak, 2014). This veiling is a characteristic of consciousness as process and it mirrors the way quantum theory conceals all the details of the state of a single particle by means of the Heisenberg Uncertainty Principle. Finally, we consider how indirect evidence in terms of anomalous probabilities in certain events can be adduced as evidence in support of reality being quantum-like at a fundamental level.

Interpretations of Quantum Theory

The Copenhagen Interpretation of quantum mechanics separates the physical universe in two parts, the first part is the system being observed, and the second part is the human agent, together with his instruments. The extended agent is described in mental terms and it includes not only his apparatus but also instructions to his colleagues on how to set up the instruments and report on their observations. The Heisenberg cut (also called the von Neumann cut) is the hypothetical interface between quantum events and an observer's information, knowledge, or conscious awareness. Below the cut everything is governed by the wave function; above the cut a classical description applies.

In the materialist conception, which leaves out quantum processes since they were until recently thought not to play a role in brain processes,

consciousness is an epiphenomenon with biology as ground. But, although this is the prevalent neuroscience paradigm, there is no way we can justify the view that material particles somehow acquire consciousness on account of complexity of interconnections between neurons. There is also the panpsychist position that consciousness is a characteristic of all things, but in its usual formulation as in the MWI position that will be discussed later it is merely a restatement of the materialist position so as to account for consciousness (Strawson, 2006). On the other hand is the position that consciousness is a transcendent phenomenon – since it cannot be a thing – which interpenetrates the material universe. The human brain, informed by the phenomenon of consciousness, has self-awareness to contemplate its own origins.

We do know that mental states are correlated with activity in different parts of the brain. With regard to mental states several questions may be asked:

1. Do mental states interact with the quantum wavefunction?
2. Are mental states governed by quantum laws?
3. Are there limitations to what the mind can know about reality?

There is considerable literature on research done on each of these questions. The question of interaction between mental states and the wavefunction was addressed by the pioneers of quantum theory and answered in the affirmative in the Copenhagen Interpretation (CI) (von Neumann, 1932/1955). In CI, the wavefunction is properly understood epistemologically, that is, it represents the experimenter's knowledge of the system. Upon observation there is a change in this knowledge. It postulates the observer without explaining how the capacity of observation arises (Schwartz et al., 2005; Stapp, 2003). Operationally, it is a dualist position, where there is a fundamental split between observers and objects. There is the added variance or interpretation of CI followed by von Neumann in his discussion of the quantum cut which implies that although the separation between observers and objects has to be brought into actual experimental setups, that it is not fundamental.

In the realistic view of the wavefunction as in the Many Worlds Interpretation (MWI), there is no collapse of the wavefunction. Rather, the interaction is seen through the lens of decoherence, which occurs when states interact with the environment producing entanglement (Zurek, 2003). By the

process of decoherence the system makes transition from a pure state to a mixture of states that observers end up measuring.

In the MWI interpretation, which may be called the ontic interpretation, the wavefunction has objective reality. The problem of collapse of the wavefunction is sidestepped by speaking of interaction between different subsystems. But since the entire universe is also a quantum system, the question of how this whole system splits into independent subsystems arises. Furthermore, if the wavefunction has objective reality, then consciousness must be seen to exist everywhere (Tegmark, 1998). Actually, this particular point was again implied by von Neumann's extension of CI who held that the wave function collapses upon observation, that the wave function is real, and that the world is quantum, which is decidedly contrary to MWI and Tegmark's recent interpretation but in agreement with the works of Wigner and Stapp, as well as our own. We emphasize that the MWI resolution is not helpful because it sees consciousness only as a correlate without any explanation for agency and freedom. There are other interpretations of quantum mechanics not as popular as either CI or MWI that will not be considered in this paper.

Construction Of Reality By The Mind

If we side-step for now the question of where the self is located and focus on the question of how the self relates to reality, we come up with several issues: First, we note that the mind is an active participant, together with the sensory organs, in the construction of reality (e.g. Wheeler, 1990: Kafatos and Nadeau, 2000; Gazzaniga, 1995; Chopra, 2014). An example of this is the phantom limb phenomenon in which there is a sensation of pain in a missing or amputated limb (Melzack, 1992). There are other cases where the phantom limb does not even correspond to anatomical reality. A recent research paper reported the case of a 57-year-old woman who was born with a deformed right hand consisting of only three fingers and a rudimentary thumb. After a car crash at the age of 18, the woman's deformed hand was amputated, which gave rise to feelings of a phantom hand that was experienced as having all five fingers (McGeoch and Ramachandran, 2012).

In the case of injury to the brain, the construction of reality by mind seen most clearly in terms of deficits that persist even though the related sensory information is reaching the brain. Consider agnosia, which is failure of

recognition that is not due to impairment of the sensory input or a general intellectual impairment. A visual agnosic patient will be unable to tell what he is looking at, although it can be demonstrated that the patient can see the object. Prosopagnosic patients are neither blind nor intellectually impaired; they can interpret facial expressions and they can recognize their friends and relations by name or voice, yet they do not recognize specific faces, not even their own in a mirror. Electrodermal recordings show that the prosopagnosic responds to familiar faces although without awareness of this fact. It appears that the patient is subconsciously registering the significance of the faces.

In a recent study (Rezlescu et al., 2014) of prosopagnosia the authors consider the role of the face-specific and the expertise (information processing) aspects in the recognition mechanism. According to the face-specific theory, upright faces are processed by face-specific brain mechanisms, whereas the expertise hypothesis claims faces are recognized by fine-grained visual processing. The authors used greebles, which are objects designed to place face-like demands on recognition mechanisms, in their experiments. They present compelling evidence that performance with greebles does not depend on face recognition mechanisms. Two individuals with acquired prosopagnosia displayed normal greeble learning despite severely impaired face performance. This research supports the theory that facespecific mechanisms are essential for recognition of faces.

Similar counterintuitive behavior of the mind includes the following: in alexia, the subject is able to write while unable to read; in alexia combined with agraphia, the subject is unable to write or read while retaining other language faculties; in acalculia, the subject has selective difficulty in dealing with numbers.

There are anecdotal accounts of blind people who can see sometime and deaf people who can likewise hear. Some brain damaged subjects cannot consciously see an object in front of them in certain places within their field of vision, yet when asked to guess if a light had flashed in their region of blindness, the subjects guess right at a probability much above that of chance.

One may consider that the injury in the brain leading to blindsight causes the vision in the stricken field to become automatic. Then through retraining it might be possible to regain the conscious experience of the images in this field. In the holistic explanation, the conscious awareness is a correlate of the activity in a complex set of regions in the brain. No region can be considered

to be producing the function by itself although damage to a specific region will lead to the loss of a corresponding function (Kak, 2000).

Split Brains

The corpus callosum connects the two hemispheres of the brain and each eye normally projects to both hemispheres. By cutting the optic-nerve crossing, the chiasm, the remaining fibers in the optic nerve transmit information to the hemisphere on the same side. Visual input to the left eye is sent only to the left hemisphere, and input to the right eye projects only to the right hemisphere.

Experiments on split-brain human patients raise questions related to the nature and the seat of consciousness. For example, a patient with left-hemisphere speech does not know what his right hemisphere has seen through the right eye. The information in the right brain is unavailable to the left brain and vice versa. The left brain responds to the stimulus reaching it whereas the right brain responds to its own input. Each half brain learns, remembers, and carries out planned activities and it is as if each half brain works and functions outside the conscious realm of the other.

Roger Sperry and his associates performed a classic experiment on cats with split brains (Sperry et al., 1956; Sperry, 1980). They showed that such cats did as well as normal cats when it came to learning the task of discriminating between a circle and a square in order to obtain a food reward, while wearing a patch on one eye. This showed that one half of the brain did as well at the task as both the halves in communication. When the patch was transferred to the other eye, the split-brain cats behaved different from the normal cats, indicating that their previous learning had not been completely transferred to the other half of the brain.

It appears that for split brains nothing is changed as far as the awareness of the patient is considered and the cognitions of the right brain were linguistically isolated all along, even before the commissurotomy was performed. The procedure only disrupts the visual and other cognitive-processing pathways.

The patients themselves seem to support this view. There seems to be no antagonism in the responses of the two hemispheres and the left hemisphere is able to fit the actions related to the information reaching the right hemisphere in a plausible theory. For example, consider the test where the

word “pink” is flashed to the right hemisphere and the word “bottle” is flashed to the left. Several bottles of different colors and shapes are placed before the patient and he is asked to choose one. He immediately picks the pink bottle explaining that pink is a nice color. Although the patient is not consciously aware of the right eye having seen the word “pink” he, nevertheless, “feels” that pink is the right choice for the occasion. In this sense, this behavior is very similar to that of blindsight patients.

The brain has many modular circuits that mediate different functions. Not all of these functions are part of conscious experience. When these modules related to conscious sensations get “crosswired,” this leads to synesthesia. One would expect that similar joining of other cognitions is also possible. A deliberate method of achieving such a transition from many to one is a part of some meditative traditions. It is significant that patients with disrupted brains never claim to have anything other than a unique awareness.

If shared activity was all there was to consciousness, then this would have been destroyed or multiplied by commissurotomy. Split brains should then represent two minds just as in freak births with one trunk and two heads we do have two minds. But that is never the case.

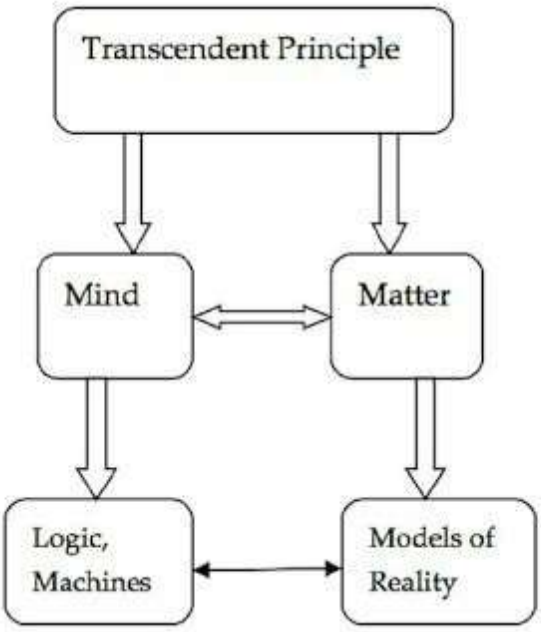


Figure 1. Universe as projection of a transcendent principle (broad arrow is projection; narrow arrow is full representation)

The experiments of Benjamin Libet showed how decisions made by a subject arise first on a subconscious level and only afterward are translated into the conscious decision (Libet, 1983). Upon a retrospective view of the event, the subject arrives at the belief that the decision occurred at the behest of his will.

In Libet's experiment the subject was to choose a random moment to flick the wrist while the associated activity in the motor cortex was measured. Libet found that the unconscious brain activity leading up to the conscious decision by the subject began approximately half a second before the subject consciously felt that he had taken his decision. But this is not to be taken as an example of retrocausation; rather, this represents a lag in the operation of the conscious mind in which this construction of reality by the mind occurs.

Orthodox Quantum Mechanics And Complementarity

As shown in Figure 1, we have dealt with models of reality constructed by the mind, and theories of physics, both of which are at the bottom layer of reality. Now we consider the next higher layer and see how we make observations. To record an observation in a laboratory requires a certain conception of the components of the system and a hypothesis related to the process. The observations are inferred from the readings on instruments or photographic traces. More direct observations register directly with our senses and here the intention in that the sense organ, such as the eye, focuses on a specific object to the exclusion of the remainder of the visual scene indicates that there is some kind of an interaction between consciousness and matter that leads to the observation.

Within the Copenhagen Interpretation, von Neumann provided a mathematical treatment (von Neumann, 1932; Bohr, 1934; Heisenberg, 1958) of this question by speaking of two different processes at work and doing so made one look for the interaction of consciousness with matter in the first process: Process 1. This is a non-causal, thermodynamically irreversible process in which the measured quantum system ends up randomly in one of the possible eigenstates (physical states) of the measuring apparatus together with the system. The probability for each eigenstate is given by the square of the coefficients c_n of the expansion of the original system state $|\varphi\rangle$

$$c_n = \langle \varphi_n | \phi \rangle$$

This represents the collapse of the wavefunction.

Process 2. This is a reversible, causal process, in which the system wave function evolves deterministically. The evolution of the system is described by a unitary operator $U(t_2,t_1)$ depending on the times t_1 and t_2, so that

$$|\varphi_2\rangle = U(t_2,t_1)\,|\varphi_1\rangle$$

The evolution operator is derived from the Schrödinger equation

$$ih\frac{d|\varphi\rangle}{dt} = H|\varphi\rangle$$

When the Hamiltonian H is time independent, U has the form:

$$U(t_2,t_1) = e^{-\frac{i}{h}H(t_2-t_1)}$$

Von Neumann was guided by the principle of psycho-physical parallelism which requires that it must be possible to describe the extra-physical process of the subjective perception as if it were in reality in the physical world. This principle is not appreciated much nowadays but it is justified since psychological states must have a corresponding physical correlate. von Neumann described the collapse of the wave function as requiring a cut between the microscopic quantum system and the observer. He said it did not matter where this cut was placed:

> The boundary between the two is arbitrary to a very large extent. ... That this boundary can be pushed arbitrarily deeply into the interior of the body of the actual observer is the content of the principle of the psycho-physical parallelism -but this does not change the fact that in each method of description the boundary must be put somewhere, if the method is not to proceed vacuously, i.e., if a comparison with experiment is to be possible. Indeed experience only makes statements of this type: an

> observer has made a certain (subjective) observation; and never any like this: a physical quantity has a certain value. (von Neumann, 1932).

To the extent that the collapse provides a result in a statistical sense, there appears to be a choice made by Nature. The other choice is made by the observer whose intention sets the measurement process in motion.

These two processes are an instance of complementarity of which the wave-particle duality of the Copenhagen Interpretation is a more commonly stated example. In reality, complementarity is a general principle that characterized all experience. Although it is sometimes seen as emerging out of complexity (Theise and Kafatos, 2013), here we view it as a fundamental principle that organized reality.

The question of complementarity was matter of debate in Greek thought. Thus reality was taken as change by Heraclitus and as things and relationships by Parmenides. In Indian thought several fundamental dichotomies such as matter and consciousness, physical reality and its descriptions, and analysis and synthesis are given. Some of the complementarities that are part of the contemporary discourse are:

Waves and particles – quantum theory
Being and time – in philosophy (Heidegger, 1962)
Law and freedom – in physics and psychology
Holistic and reductionist views – in system theory
Matter and consciousness.

If we take complementarity as the common thread in phenomena that are described at different levels, then one might suspect that quantum theory should also underlie consciousness.

Veiled Monlocality

According to quantum mechanics reality is nonlocal and objects separated in time and space can be strongly correlated. Thus for a pair of entangled particles billions of miles apart, an observation on one particle causes an instant collapse of the wavefunction of the twin particle. Entanglement also persists across time and an observation made now can change the past as in Wheeler's delayed choice experiment (Wheeler, 1990). Yet there is no way one can confirm such an entanglement for a specific pair of particles for any

attempt at verification will be defeated by the collapse of the wavefunction. Probability experiments for ensembles of particles to separate classical from quantum effects do exist (Bell, 1964).

If reality is nonlocal why does it appear to our senses as local and separated? The idea of veiled nonlocality is that consciousness disguises its wholeness and nonlocality in order to produce local processes. This idea arose out of the experimental fact that no loophole free test of nonlocality has yet been found (Kak, 2014). It can be seen as quite like the Heisenberg's Uncertainty Principle which places limits on the description of the state of a specific particle.

This filtering process allows for specific observations and thoughts in a classical world of everyday experience, while keeping quantum and general relativistic processes out of sight. Another example of veiled nonlocality in gravitation is the hypothesis of cosmic censorship (Penrose, 1999), which describes the inability of distant observers to directly observe the center of a black hole, or "naked singularity." (Kafatos and Kak, 2014)

Veiled nonlocality is like a fuzzification that breaks up a whole system into several locally connected subsystems. We illustrate below in Figure 2 the general idea.

The breakup of a whole into subsystems can be shown through simple observation. The five senses cannot perceive the quantum world, and yet perception depends upon it. The quantum world is hidden from us the way the operation of the brain is hidden. If you think the word "elephant" and see an image of the animal in your mind's eye, you aren't aware of the millions of neurons firing in your brain in order to produce them. Yet those firings - not to mention the invisible cellular operations that keep every part of your body alive -are the foundation of the brain's abilities.

Just as the image of an elephant is the visible end point of veiled processes, the material world is founded on a veiled reality. Moreover, to produce a single mental image, the whole brain must participate. Specific areas, mainly the visual cortex, produce mental pictures, but they are coordinated with everything else the brain does, such as sustaining the cerebral cortex, which recognizes what an image is, and maintaining a healthy body. This points to a profound link between the brain and the cosmos. The two are inseparable. In fact, in our view, complementarity assures that they appear as separate and one causing the other but in fact they are aspects of undivided wholeness

brought about by consciousness, which is undivided, nonlocal and whole (see also below).

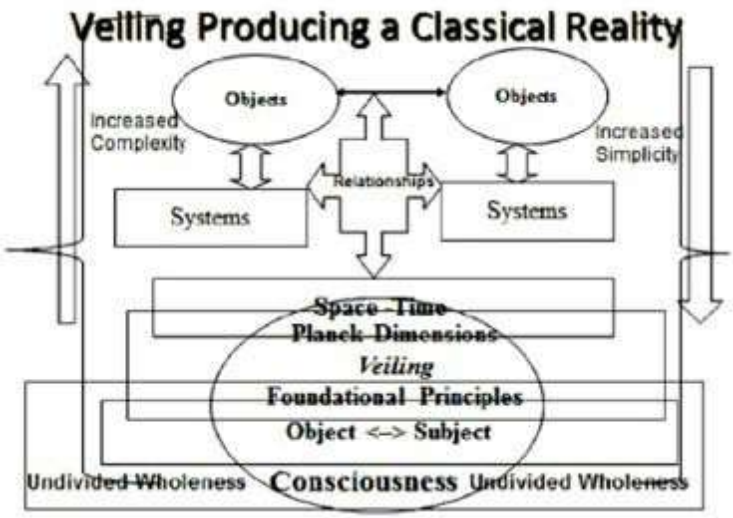


Figure 2: Breakup of the undivided wholeness of consciousness and implied quantum wholeness through the veiling process.

The veiling of reality is in consonance with the idea of the mind constructing its reality. Such a veiling even occurs in the scientific process which filters out and discards a huge portion of human experience -almost everything one would classify as subjective. Its model is just as selective, if not more so, than the model which shapes a religious or metaphysical reality. As far as the brain is concerned, neural filtering is taking place in all models, whether they are scientific, spiritual, artistic, or psychotic. The brain is a processor of inputs, not a mirror to reality.

If our brains are constantly filtering every experience, there is no way anyone can claim to know what is "really" real. You can't step outside your brain to fathom what lies beyond it. Just as there is a horizon for the farthest objects that emit light in the cosmos, and a farthest horizon for how far back in time astronomy can probe, there is a farthest horizon for thinking. The brain operates in time and space, having linear thoughts that are the end point of a selective filtering process. So whatever is outside time and space is inconceivable, and unfiltered reality would probably blow the brain's circuits, or simply be blanked out.

Consciousness as Foundational Principle of Reality

We propose, as shown in Figure 2, that consciousness-based reality limited by a fundamental veiling provides meaning and the appearance of what we say is objective reality, systems, objects and relationships at all levels of organization. The quantum and the classical worlds aren't separated merely by a physical gap. On one side the behavior of the quantum is meaningless, random, and unpredictable. A subatomic particle has no purpose or goal. On the other side, in the classical world, it goes without saying that each of us lives our life with purpose and meaning in mind. To accept this as self-

evident is crucial to getting up every morning, so arcane disputations about free will and determinism are, pragmatically speaking, not relevant to the more fundamental question: Can randomness produce meaning, and if so, how?

To lead a meaningless existence is intolerable, so it's ironic that quantum physics bases the cosmos on meaningless operations, and doubly ironic when you consider that physics itself is a meaningful activity. The phrase "participatory universe," sums up how the very process of observation changes the outcome (Wheeler, 1990). Observation not only changes the outcome in a random sense, but it can actually be used to steer to unfolding of a physical system to whichever way one chooses by the quantum Zeno effect (Misra and Sudarshan, 1974; Kak, 2007).

By definition reality is complete; therefore, whatever purpose and meaning we find in it, using limited human capacities, is a fragment of a pre-existing state, which we term the state of infinite possibilities. The fragment cannot be the whole, although in what may appear as strange, the part implies the whole (Kafatos and Nadeau, 2000; Nadeau and Kafatos, 1999). And the whole is more than the sum of the parts, because no amounts of parts, no matter how many, form the whole. This state is veiled from us, just as the existence of every possible subatomic particle is hidden from us. The concept of a field contains within it this relationship between the whole and its parts. There is no reason to exclude the field of consciousness from exhibiting the same relationship to its parts, whence the insight that there can be only one consciousness, not many (Schrödinger, 1974).

In a matter–alone conception of the universe, we cannot conceive of a reality that has no objects in it, and only pure consciousness. However, such a matter alone conception goes against the very nature of a quantum universe as quantum theory contains observation through measurement. Yet without awareness, nothing can be perceived. Having placed its trust in "reality as given," science overlooks the selfevident fact that nothing can be experienced without consciousness. It is a more viable candidate for "reality as given" than the physical universe. Even if the materialist position is accepted that claims consciousness is an epiphenomenon, one cannot escape the fact that consciousness existed from the very beginning although it may have been in a latent form.

If enlightenment consists of seeing beyond the veiling that accompanies a

commonsensical view of the universe, it too isn't some sort of obscure mysticism but recognition that self-awareness can know itself. The mind isn't only the thoughts and sensations constantly streaming through it. There is a silent, invisible foundation to thought and sensations. Until that background is accounted for, individual consciousness mistakes itself, and in so doing it cannot help but mistake what it observes. This is expressed in a Vedic metaphor about the wave and the ocean: A wave looks like an individual as it rises from the sea, but once it sinks back, it knows that it is ocean and nothing but ocean.

Cosmic consciousness, then, isn't just real -it's totally necessary. It rescues physics and science in general from a dead end -the total inability to create mind out of matter -and gives it a fresh avenue of investigation. We exist as creatures with a foot in two worlds that are actually one, divided by appearance and reality. Consciousness as a transcending principle provides a way to bridge the two processes of quantum theory. We emphasize that this view is the only one that is ultimately self-consistent. Material views of reality ultimately run into unanswerable conundrums and inconsistencies or the need of strange views such as the MWI which is founded on the existence of real outcomes without the agency of consciousness.

Conclusion

Quantum theory has reached the point where the source of all matter and energy is a vacuum, a nothingness that contains all the possibilities of everything that has ever existed or could exist. These possibilities then emerge as probabilities before "collapsing" into localized quanta, manifesting as the particles in space and time that are the building blocks of atoms and molecules.

Where do the probabilities exist? Where is the exquisite mathematics that we have at our disposal to be found? Some sort of "real space", or material-like space? That of course makes no sense. The probability of an event (even an event like winning the lottery or flying on the day a blizzard strikes) only exists as long as there is someone to ask the question of what may happen and to measure the outcomes when they occur. So probabilities and other mathematical expressions, which are the foundation of modern quantum physics, imply the existence of observation. Countless acts of observation give substance and reality to what would otherwise be ghosts of existence.

This solves the so-called “measurement problem” of quantum theory which is there if one assumes a reality independent of observation.

It is more elegant, self-consistent and far easier to accept as a working hypothesis that sentience exists as a potential at the source of creation, and the strongest evidence has already been put on the table: Everything to be observed in the universe implies consciousness. Some theorists try to rescue materialism by saying that information is encoded into all matter, but “information” is a mental concept, and without the concept, there’s no information in anything, since information by definition must ultimately contain meaning (even if it is a sequence of 0s and 1s as in computer language), and only minds grasp meaning. Besides, assuming that this kind of bit information is an encoded property of matter implies hidden variables (the bits) which have been ruled out by the Bell (1964) Theorem and laboratory experiments related to it (Aspect, Dalibard and Roger, 1984). Does a tree falling in the forest make no sound if no one is around to hear it? Obviously not. The crash vibrates air molecules, but sound needs hearing in order for these vibrations to be transformed into perception.

We’ve proposed that consciousness creates reality and makes it knowable - if there’s another viable candidate, it must pass the acid test: Transform itself into thoughts, feelings, images, and sensations. Science isn’t remotely close to turning the sugar in a sugar bowl into the music of Mozart or the plays of Shakespeare. Your brain converts blood sugar into words and music, not by some trick of the molecules in the brain, since they are in no way special or privileged. Rather, your consciousness is using the brain as a processing device, moving the molecules where they are needed in order to create the sight, sound, touch, taste, and smell of the world.

In everyday life, we get to experience the miracle of transformation that causes a three-dimensional world, completed by the fourth dimension of time, to manifest before our eyes. The great advantage of experience is that it isn’t theoretical. Reality is never wrong, and all of us are embedded in reality, no matter what model we apply to explain it.

The indirect examination of consciousness through the process of veiling as sketched in this paper can be tested by means of experiments. For example, the proposed theory can be refuted if loophole-free tests to confirm nonlocality are devised. On the other hand, cognitive processes with anomalous probabilities would lend support to our thesis.

We finally note that the cut of Heisenberg/von Neumann does not exist anywhere: The observer must be one, all observers are appearances of distinct or independent entities, taking on an apparent "reality" through the veiling action. As stated above, our thesis resolves the measurement problem. In reading von Neumann, there is a strong hint that he also held this view.

REFERENCES

Aspect, A., Dalibard, J., Roger, G. (1981). Physical Rev. Letters, 47, p. 460.

Bell, J. (1964) On the Einstein Podolsky Rosen paradox. Physics 1 195–200.

Bohr, N. (1934) Atomic theory and the description of nature. Cambridge: Cambridge University Press.

Buser, M., Kajari, E., and Schleich,, W.P. (2013). Visualization of the Gödel universe. New Journal of Physics 15, 013063.

Chopra, D. (ed.) (2014). Brain, Mind, Cosmos. Trident Media, New York.

Davis, M. (1965). The Undecidable: Basic papers on undecidable propositions, unsolvable problems and computable functions. Raven Press, New York.

Freeman, W. and Vitiello, G. (2006) Nonlinear brain dynamics as macroscopic manifestation of underlying many-body dynamics. Physics of Life Reviews 3: 93-118.

Gazzaniga, M.S. (1995) The Cognitive Neurosciences. Cambridge, MA The MIT Press. Hameroff, S. and Penrose, R. (2003) Conscious events as orchestrated space-time selections. NeuroQuantology 1: 10-35.

Heidegger, M. (1962) Being and Time, trans. by John Macquarrie & Edward Robinson. London: SCM Press.

Heisenberg, W. (1958) Physics and Philosophy: The Revolution in Modern Science, London: George Allen & Unwin.

Herrnstein, R.J. (1985). Riddles of natural categorization. Phil. Trans. R. Soc. Lond. B 308: 129-144.

Kafatos, M. and Nadeau, R. (2000) The Conscious Universe. Springer.

Kafatos, M. and Kak, S. (2014) Veiled nonlocality and cosmic censorship. arXiv:1401.2180

Kak, S. (2000) Active agents, intelligence, and quantum computing. Information Sciences 128: 1-17

Kak, S. (2007) Quantum information and entropy. International Journal of Theoretical Physics 46, 860-876.

Kak, S. (2012) Hidden order and the origin of complex structures. In Swan, L., Gordon, R., and Seckbach, J. (editors), Origin(s) of Design in Nature. Dordrecht: Springer, 643652.

Kak, S. (2014) From the no-signaling theorem to veiled non-locality. NeuroQuantology 12: 19.

Lambert, N. et al, (2013) Quantum biology. Nature Physics 9, 10–18.

Libet, B. et al. (1983) Time of conscious intention to act in relation to onset of cerebral activity (readiness-potential) The unconscious initiation of a freely voluntary act. Brain 106: 623–642.

McGeoch, P., and Ramachandran, V., (2012), The appearance of new phantom fingers postamputation in a phocomelus, Neurocase, 18 (2), 95-97.

Melzack, R. (1992). Phantom limbs. Scientific American (April): 120–126.

Misra, B. and Sudarshan, E. C. G. (1977). The Zeno's paradox in quantum theory. Journal of Mathematical Physics 18, 758–763.

Nadeau, R. and Kafatos, M. (1999). The Non-local Universe: The New Physics and Maters of the Mind, Oxford University Press, Oxford.

Penrose, R. (1994) Shadows of the Mind. New York: Oxford.

Penrose, R. (1999) The question of cosmic censorship. J. Astrophys. Astr. 20: 233–248.

Roy, S. and Kafatos, M. (2004). Quantum processes and functional geometry: new perspectives In brain dynamics. FORMA, 19, 69.

Rezlescu, C., Barton, J. J. S., Pitcher, D. & Duchaine, B. (2014) Normal acquisition of expertise with greebles in two cases of acquired prosopagnosia. Proc Natl Acad. Sci. USA http://dx.doi.org/10.1073/pnas.1317125111.

Schrödinger, E. (1974). What is Life? and Mind and Matter. Cambridge University Press.

Schwartz, J.M., Stapp, H.P., Beauregard, M. (2005) Quantum physics in neuroscience and psychology. Phil. Trans. Royal Soc. B 360: 1309-1327.

Sperry, R. (1980) Mind-brain interaction: Mentalism, yes; dualism, no. Neuroscience 5 (2): 195–206

Sperry, R. W., Stamm, J. S., and Miner, N. (1956) Relearning tests for interocular transfer following division of optic chaism and corpus callosum in cats. J. Compar. Physiol. Psych. 49: 529-533.

Stapp, H.P. (2003) Mind, Matter, and Quantum Mechanics. New York:

Springer-Verlag. Strawson, G. (2006) Realistic monism: Why physicalism entails panpsychism. Journal of Consciousness Studies 13: 10–11, 3–31.

Tegmark, M. (1998) The interpretation of quantum mechanics: many worlds or many words? Fortsch. Phys. 46: 855-862.

Theise, N.D. and Kafatos, M. (2013) Complementarity in biological systems: a complexity view. Complexity 18: 11-20.

Von Neumann, J. (1932/1955) Mathematical Foundations of Quantum Mechanics, translated by Robert T. Beyer, Princeton, NJ: Princeton University Press.

Wheeler, J.A. (1990). Information, physics, quantum: the search for links. In Complexity, Entropy, and the Physics of Information, W.H. Zurek (Ed.). Addison-Wesley, pp. 328.

Wigner, E. (1983). "The Problem of Measurement", In: Quantum Theory and Measurement, J.A. Wheeler, & W.H. Zurek (Eds.), Princeton University Press, Princeton.

Zurek, W.H. (2003) Decoherence, einselection, and the quantum origins of the classical. Rev. Mod. Phys. 75: 715-775

35. Quantum Reality and Mind

Henry P. Stapp
Lawrence Berkeley Laboratory, University of California, Berkeley, California

Abstract

Two fundamental questions are addressed within the framework of orthodox quantum mechanics. The first is the duality-nonduality conflict arising from the fact that our scientific description of nature has two disparate parts: an empirical component and a theoretical component. The second question is the possibility of meaningful free will in a quantum world concordant with the principle of sufficient reason, which asserts that nothing happens without a sufficient reason. The two issues are resolved by an examination of the conceptual and mathematical structure of orthodox quantum mechanics, without appealing to abstract philosophical analysis or intuitive sentiments.

Key Words: Quantum Reality, Mind, Mind-Matter, Free Will, Duality, Mental monism

1. Introduction

The first purpose of this article is to explain the nature of the connection between mind and matter and how orthodox quantum mechanics is both dualistic and nondualistic: it is dualistic on a pragmatic, operational level, but is nondualistic on a deeper ontological level.

The second purpose is to reconcile a meaningful concept of human freedom with the principle of sufficient reason; with the principle that nothing happens without a sufficient reason.

To lay a framework for discussing these two issues I shall begin by describing some contrasting ideas about the nature of reality advanced by three towering intellectual figures, Rene Descartes (1596-1650), Isaac Newton (1642-1727), and William James (1842-1910).

René Descartes conceived nature to be divided into two parts: a mental part and a physical part. The mental part, which he called "res cogitans", contains our thoughts, ideas, and feeling, whereas the physical part, called "res extensa", is defined here to be those aspects of nature that we can describe by assigning mathematical properties to space-time points. Examples of physical aspects of our understanding of nature are trajectories of physical particles, the electric field E(x,t), and the quantum mechanical field (operator) A(x,t). Descartes allowed the mental and physical aspects to interact with each other, but only for those physical parts that are located inside human brains. This is the classic Cartesian notion of duality.

Isaac Newton built the foundations of "modern physics" upon the ideas of Descartes, Galileo, and Kepler. The astronomical observations of Tycho Brahe led to Kepler's three laws of planetary motion. These laws, coupled to Galileo's association of gravity with acceleration, led directly to Newton's inverse square law of gravitational attraction, and his general laws of motion. Newton extended these dynamical ideas, with tremendous success, down to the scale of terrestrial motions, to the tides and falling apples etc.. He also conjectured an extension down to the level of the atoms. According to that hypothesis, the entire physically described universe, from the largest objects to the smallest ones, would be bound by the precept of physical determinism,

which is the notion that a complete description of the values of all physically described variables at any one time determines with certainty the values of all physically described variables at any later time. This idea of universal physical determinism is a basic precept of the development of Newtonian dynamics into what is called "classical physics".

1a. The Omission of the Phenomenal Aspects of Nature. The dynamical laws of classical physics are formulated wholly in terms of physically described variables: in terms of the quantities that Descartes identified as elements of "res extensa". Descartes' complementary psychologically described things, the elements of his "res cogitans", were left completely out: there is, in the causal dynamics of classical physics, no hint of their existence. Thus there is not now, nor can there ever be, any rational way to explain, strictly on the basis of the dynamical precepts of classical physics, either the existence of, or any causal consequence of, the experientially described aspects of nature. Yet these experiential aspects of nature are all that we actually know.

This troublesome point was abundantly clear already at the outset:

Newton: "…to determine by what modes or actions light produceth in our minds the phantasm of colour is not so easie."

Leibniz: "Moreover, it must be confessed that perception and that which depends upon it are inexplicable on mechanical grounds, that is to say, by means of figures and motions."

Classical physics, by omitting all reference to the mental realities, produces a logical disconnect between the physically described properties represented in that theory and the mental realities by which we come to know them. The theory allows the mental realities to know about the physical aspects of nature, yet be unable to affect them in any way. Our mental aspects are thereby reduced to "Detached Observers", and Descartes' duality collapses, insofar as the causally closed physical universe is concerned, to a physics-based nonduality; to a physical monism, or physicalism. Each of us rejects in actual practice the classical-physics claim that our conscious thoughts and efforts can have no affects on our physical actions. We build our lives, and our political, judicial, economic, social, and religious institutions, upon the apparently incessantly reconfirmed belief that, under normal wakeful conditions, a person's intentional mental effort can influence his physical actions.

William James, writing in 1892, challenged, on rational grounds, this classical-physics-based claim of the impotence of our minds. At the end of his book Psychology: The Briefer Course he reminded his readers that "the natural science assumptions with which we started are provisional and revisable things". That was a prescient observation! Eight years later Max Planck discovered a new constant of nature that signaled a failure of the precepts of classical physics, and by 1926 the precepts of its successor, quantum mechanics, were firmly in place.

The most radical shift wrought by quantum mechanics was the explicit introduction of mind into the basic conceptual structure. Human experience was elevated from the role of 'a detached observer' to that of 'the fundamental element of interest':

Bohr: "In our description of nature the purpose is not to disclose the real essence of phenomena but only to track down as far as possible relations between the multifold aspects of our experience." (Bohr, 1934, p.18).

Bohr: "The sole aim [of quantum mechanics] is the comprehension of observations…(Bohr, 1958, p.90).

Bohr: The task of science is both to extend the range of our experience and reduce it to order (Bohr, 1934, p.1)

Heisenberg: "The conception of the objective reality of the elementary particles has evaporated not into the cloud of some new reality concept, but into the transparent clarity of a mathematics that represents no longer the behaviour of the particles but our knowledge of this behavior" (Heisenberg, 1958a, p. 95).

This general shift in perspective was associated with a recasting of physics from a set of mathematical connections between physically described aspects of nature, into set of practical rules that, eschewing ontological commitments, predicted correlations between various experiential realities on the basis of their postulated dynamical links to certain physically describable aspects of our theoretical understanding of nature.

In view of this fundamental re-entry of mind into basic physics, it is nigh on incomprehensible that so few philosophers and non-physicist scientists entertain today, more than eight decades after the downfall of classical physics, the idea that the physicalist conception of nature, based on the invalidated classical physical theory, might be profoundly wrong in ways highly relevant to the mind-matter problem.

Philosophers are often called upon to defend highly counter-intuitive and apparently absurd positions. But to brand as an illusion, and accordingly discount, the supremely successful conceptual foundation of our lives---the idea that our conscious efforts can influence our physical actions---on the basis of its conflict with a known-to-be-false theory of nature that leaves out all that we really know, is a travesty against reason, particularly in view of the fact that the empirically valid replacement of that empirically invalid classical theory is specifically about the details of the connection between our consciously chosen intentional actions and the experiential feedbacks that such actions engender.

1b. Von Neumann's Dualistic Quantum Mechanics. The logician and mathematician John von Neumann (1955/1932) formalized quantum mechanics in a way that allowed it to be interpreted as a dualistic theory of reality in which mental realities interact in specified causal ways with physically described human brains. This orthodox quantum ontology is in essential accord with the dualistic ideas of Descartes.

An objection often raised against Cartesian dualism is couched as the query: How can ontologically distinct aspects of nature ever interact? Must not nature consist ultimately of one fundamental kind of stuff in order for its varied components to be able to cohere.

This objection leads to a key question: What is the ontological character of the physical aspect of quantum mechanics?

2. The Ontological Character of the Physical Aspect of the Orthodox (von Neumann-Heisenberg) Quantum Mechanics.

The physical aspect of the quantum mechanical conception of nature is represented by the quantum state. This state is physical, in the defined sense that we can describe it by assigning mathematical properties to space-time points. But this physical aspect is does not have the ontological character of a material substance, in the sense in which the physical world of Newtonian (or classical) physics is made of material substance: it does not always evolve in a continuous manner, but is subject to abrupt "quantum jumps", sometimes called "collapses of the wave function".

Heisenberg (1958b) couched his understanding of the ontological character of the reality lying behind the successful quantum rules in terms of the Aristotelian concepts of "potentia" and "actual" . The quantum state does not

have the ontological character of an "actual" thing. It has, rather, the ontological character of "potentia": of a set of "objective tendencies for actual events to happen". An actual event, in the von Neumann-Heisenberg orthodox ontology, is "The discontinuous change in the probability function [that] takes place with the act of registration…in the mind of the observer". (Heisenberg, 1958b, p. 55)

The point here is that in orthodox (von Neumann-Heisenberg) quantum mechanics the physical aspect is represented by the quantum state, and this state has the ontological character of potentia---of objective tendencies for actual events to happen. As such, it is more mind-like than matter-like in character. It involves not only stored information about the past, but also objective tendencies pertaining to events that have not yet happened. It involves projections into the future, elements akin to imagined ideas of what might come to pass. The physical aspects of quantum mechanics are, in these ways, more like mental things than like material things.

Furthermore, a quantum state represents probabilities. Probabilities are not matter-like. They are mathematical connections that exist outside the actual realities to which they pertain. They involve mind-like computations and evaluations: weights assigned by a mental or mind-like process.

Quantum mechanics is therefore dualistic in one sense, namely the pragmatic sense. It involves, operationally, on the one hand, aspects of nature that are described in physical terms, and, on the other hand, also aspects of nature that are described in psychological terms. And these two parts interact in human brains in accordance with laws specified by the theory. In these ways orthodox quantum mechanics is completely concordant with the defining characteristics of Cartesian dualism.

Yet, in stark contrast to classical mechanics, in which the physically described aspect is matter-like, the physically described aspect of quantum mechanics is mind-like! Thus both parts of the quantum Cartesian duality are ontologically mind-like.

In short, orthodox quantum mechanics is Cartesian dualistic at the pragmatic/operational level, but mentalistic on the ontological level.

This conclusion that nature is fundamentally mind-like is hardly new. But it arises here not from some deep philosophical analysis, or religious insight, but directly from an examination of the causal structure of our basic scientific theory.

3. Natural Process, Sufficient Reason, and Human Freedom.

There are two fundamentally different ways to cope with the demands of the theory of relativity.

The first is the classical-physics-based Einsteinian idea of a Block Universe: a universe in which the entire future is laid out beforehand, with our experiences being mere perspectives on this preordained reality, viewed from particular vantage points in spacetime.

A second way to accommodate, rationally, the demands of special relativity is the quantum-physics-based Unfolding Universe, in which facts and truths become fixed and definite in the orderly way allowed by relativistic quantum field theory (Tomonaga, 1946; Schwinger 1951; Stapp, 2007, p. 92) with our experiences occurring in step with the coming into being of definite facts and truths.

I subscribe to the latter idea: to the idea of an unfolding reality in which each experienced increment of knowledge is associated with an actual event in which certain facts or truths become fixed and definite.

I also subscribe to the idea that this unfolding conforms to the principle of sufficient reason, which asserts that no fact or truth can simply "pop out of the blue", with no sufficient reason to be what it turns out to be.

An important question, then, is whether such a concordance with the principle of sufficient reason precludes the possibility of meaningful human freedom. Is human freedom an illusion, in the sense that every action that a person makes was fixed with certainty already at the birth of the universe?

Laplace's classical argument for the "certainty of the future" states (in condensed form):

"For a sufficiently powerful computing intellect that at a certain moment knew all the laws and all the positions, nothing would be uncertain, and the future, just like the past, would be present before its eyes."

This view argues for "certainty about the future"; for a certainty existing at an earlier moment on the basis of information existing at that earlier moment. It contemplates:

1. A computing intellect existing outside or beyond nature itself, able to "go" in thought where the actual evolving universe has not yet gone.

2. Invariant causal laws.

But nothing really exists outside the whole of nature itself! Thus nature

itself must make its own laws/habits. And these habits could themselves evolve. Even if there is a sufficient reason, within the evolving reality, for every change in the laws, and every generation of a fact, it is not evident that any intellect standing outside the evolving reality itself could compute, on the basis of what exists at a certain moment, all that is yet to come. For the evolution of reason-based reasons may be intrinsically less computable than the evolution of the mathematically formulated physically described properties of the classical-physics approximation to the actual laws of nature. Reason encompasses computable mathematics, but computable mathematics may not encompass reason. Reason is a category of explanation more encompassing than mathematical computation.

The laws of classical mechanics are cast in a particular kind of mathematical form that allows, in principle, a "mathematical computation" performed at an early time to predict with certainty the state of the universe at any later time. But this is very special feature of classical mechanics. It is far from obvious that the---definitely nonclassical---real world must exhibit this peculiar 'computability" feature.

The notion that a reason-based unfolding of the actual world is computable is an extrapolation from the classical-physics approximation that is far too dubious to provide the basis of a compelling argument that, in a mind-based quantum universe evolving in accordance with the principles of both quantum mechanics and sufficient reason, the outcomes of human choices are certain prior to their actual occurrence. It is far from being proved that, in a universe of that kind, the exact movement of the computer key that I am now pressing was certain already at the birth of the universe. "Reasons" could lack the fantastic computability properties that the physically described features of classical physics enjoy. But in that case our present reason-based human choices need not have been fixed with certainty at the birth of the universe. Within orthodox quantum mechanics meaningful human freedom need not be an illusion.

4. Reason-Based Dynamics Versus Physical-Description-Based Dynamics.

The arguments given above rest heavily upon the contrast between the reason-based dynamics of the unfolding universe described by quantum mechanics and the physical-description-based dynamics of the block universe

described by classical mechanics. In this final section I shall pinpoint the technical features of orthodox quantum mechanics that underlie this fundamental difference between these two theories.

Von Neumann created a formulation of quantum mechanics in which all the physical aspects of nature are represented by the evolving quantum mechanical state (density matrix) of the universe. Each subsystem of this physically described universe is represented by a quantum state obtained by performing a certain averaging procedure on the state of the whole universe. Each experience of a person is associated with an "actual event". This event reduces, in a mathematically specified way, the prior quantum state of this person's brain---and consequently the quantum state of the entire universe---to a new "reduced" state. The reduction is achieved by the removal of all components of the state of this person's brain that are incompatible with the increment of knowledge associated with the experience. The needed mapping between "experiential increments in a person's knowledge" and "reductions of the quantum mechanical state of that person's brain" can be understood as being naturally created by trial and error learning of the experienced correlations between intentional efforts and the experiential feedbacks that these efforts tend to produce.

A key feature of von Neumann's dynamics is that it has two distinct kinds of mind-brain interaction. Von Neumann calls the first of these two processes "process 1". It corresponds to a choice of a probing action by the person, regarded as an agent or experimenter. The second kind of mind-brain interaction was called by Dirac "a choice on the part of nature". It specifies nature's response to the probing action selected by a logically precededing process 1 action. Von Neumann uses the name "process 2" to denote the physical evolution that occurs between the mind-brain (collapse) interactions. I therefore use the name "process 3" to denote the reduction/collapse process associated with nature's response to the process 1 probing action.

The mathematical form of process 1 differs from that of process 3. This mathematical difference causes these two processes to have different properties. In particular, process-1 actions have only local effects, in the sense that the dependence of the predictions of quantum mechanics upon a process-1 action itself, without a specification of the response, is confined (in the relativistic version) to the forward light-cone of the region in which the process-1 physical action occurs: the empirically observable effects of a

process-1 action never propagate faster than the speed of light. On the other hand, nature's response (process 3) to a localized process-1 action can have observable statistical effects in a faraway contemporaneous region. The no-faster-than-light property of the empirically observable effects of any process-1 action is what justifies the word "relativistic" in relativistic quantum theory, even though the underlying mathematical description involves abrupt process-1-dependent faster-than-light transfers of information in connection with nature's response to the process-1 action.

Process 2 is a generalization of the causal process in classical mechanics, and, like it, is deterministic: the state of the universe at any earlier time completely determines what it will evolve into at any later time, insofar as no process 1 or process 3 event intervenes. But if no process 1 or process 3 event intervenes then the process 2 evolution would take the initial "big bang" state of the universe into a gigantic smear in which, for example, the moon would be smeared out over the night sky, and the mountains, and the cities, and we ourselves, would all be continuously spread out in space.

It is the process 1 and process 3 actions that, in the orthodox ontology, keep the universe in line with human experiences. On the other hand, the von Neumann ontology certainly does not exclude the possibility that non-human-based analogs of the human-based process 1 and follow-up process 3 actions also exist. Rather, it explains why the existence of reduction processes associated with other macroscopic agents would be almost impossible to detect empirically. These features of the von Neumann ontology justify focusing our attention here on the human involvement with nature.

Process 1, unlike process 2, is not constrained by any known law. In actual practice our choices of our probing actions appear to us to be based on reasons. We open the drawer in order to find the knife, in order to cut the steak, in order to eat the steak, in order to satisfy our hunger. Whilst all of this chain of reasons would, within the deterministic framework of classical physics, need to be, in principle, explainable in mathematical ways based upon the physical description of the universe, there is no such requirement in orthodox quantum mechanics: the sufficient reasons could be "reasons"; reasons involving the experiential dimension of reality, rather than being fully determined within the physical dimension. And these reasons could be, at each individual moment of experience, sufficient to determine the associated process 1 choice, without those choices having been

mathematically computable from the state of the universe at earlier times.

The process 3 selection on the part of nature, unlike the process 1 choice, is not completely unconstrained: it is constrained by a statistical condition. According to the principle of sufficient reason, the process 3 choice must also be, in principle, determined by a sufficient reason. But, as emphasized above, nature's choice is nonlocal in character. Thus the reason for a process 3 choice need not be located at or near the place where the associated process 1 action occurs. Yet, as was clear already in classical statistical mechanics, there is an á priori statistical rule: equal volumes of phase space are equally likely. The (trace-based) statistical rule of quantum mechanics is essentially the quantum mechanical analog of this á priori statistical rule. The quantum statistical rule is therefore the natural statistical representation of the effect of a reason-based choice that is physically far removed from its empirical process 3 manifestation.

In closing, it is worth considering the argument of some physicalist philosophers that the replacement of classical mechanics---upon which physicalism is based---by quantum mechanics is not relevant to the resolution of the mind-matter problem for the following reason: that replacement has no bearing on the underlying problem of human freedom. The argument is that the essential difference between the two theories is (merely) that the determinism of classical mechanics is disrupted by the randomness of quantum mechanics, but that an introduction of randomness into the dynamics in no way rescues the notion of meaningful human freedom: a random choice is no better than a deterministic choice as an expression of meaningful human freedom.

This physicalist argument flounders on the fact that the element of quantum randomness enters quantum mechanics only via process 3, which delivers nature's choice. Man's choice enters via process 1, which is the logical predecessor to nature's process 3 "random" choice. In orthodox quantum mechanics, no elements of quantum randomness enter into man's choice. Nor is man's choice fixed by the deterministic aspect of quantum mechanics: that aspect enters only via process 2. Von Neumann's process 1 human choice is, in this very specific sense, "free": it is von Neumann's representation of Bohr's "free choice of experimental arrangement for which the quantum mechanical formalism offers the appropriate latitude" (Bohr 1958. p.51). Human choices enter orthodox quantum mechanics in a way not determined

by a combination of the deterministic and random elements represented in the theory.

References

Bohr, N. (1934). Atomic Physics and the Description of Nature. Cambridge University Press, Cambridge, UK.

Bohr, N. (1958). Atomic Physics and Human Knowledge. Wiley, New York, US.

Heisenberg, W. (1958a). The representation of ature in contemporary physics. Daedalus, 87 (summer), 95-108.

Heisenberg, W. (1958b). Physics and Philosophy. Harper, New York, US.

James. W. (1892). Psychology: The Briefer Course. In: William James: Writings 1879-1899. Library of America (1992), New York, US.

Schwinger, J. (1951). Theory of Quantized Fields 1. Physical Review, 82, 914-927.

Stapp, H.P. (2007). Mindful Universe: Quantum Mechanics and the Participating Observer. Springer, Berlin.

Tomonaga, S. (1946). On a relativistically invariant formulation of the quantum theory of wave fields. Progress of Theoretical Physics, 1, 27-42.

Von Neumann, J. (1955/1932). Mathematical Foundations of Quantum Mechanics. Princeton University Press, Princeton New Jersey, US. (Translation of the German original: Mathematische Grundlagen der Quantenmechanik, Springer, Berlin, 1932.)

36. The Cognitive Perception of Happiness: From the Upanishads to Quantum Theory

Jay Kumar

Department of Religious Studies. Chapman University, Orange, California 92866

Abstract:

The article explores the intriguing relationship between temporal qualia and the cognitive perception of happiness through the modern lens of quantum

theory and the science of consciousness, along with their analogues in the ancient Indian monistic traditions of the Upanishads. Specifically, the Upanishads outline a cosmological framework of reality that parallels the fundamental principles of modern quantum theory—one established within temporal non-locality and complementarity. While quantum concepts such as non-locality and complementarity apply to both space and time, this work explores them primarily within a temporal context. The ultimate goal of this work is to demonstrate how certain principles in quantum theory align with philosophical concepts in the Upanishads that propose how consciousness appears to exist in a state of complementarity—simultaneously at the infinite, timeless, non-local level and at the finite, temporally bound, localized realm. The mechanism that accounts for the way the mind conceals the ability to perceive the universe in its fundamental, non-local state is filtration, both quantum and cognitive. Finally, the article offers textual evidence from the Upanishads that state the attainment of happiness begins by first dismantling the cognitive filters that veil reality and create the perceptual illusion of linear and localized time. While the term happiness is both a culturally and socially relative construct and conveys a specific semantic meaning within the western psyche, the same term within the ancient Indian worldview connotes the sense of embodied wholeness and existential completion. Happiness, according to the Upanishads, is a fundamental state of existence that aligns the sacred self with the timeless, infinite dimension of the cosmos.

Keywords: non-locality, temporal qualia, wave function, consciousness, brain, quantum filtration, cognitive perception, perennial philosophy, Hinduism, Upanishads, Vedanta, happiness, pleasure, atman, Brahman, maya, moksha.

1. Complementarity and Quantum Filtration

"To see a world in a grain of sand and heaven in a wild flower, hold infinity in the palm of your hand and eternity in an hour." William Blake

There exists a persistent conundrum regarding the human perception of reality, framed within the context that "our sense of reality is different from its mathematical basis as given by physical theories. Although nature at its deepest level is quantum, mechanical and nonlocal, it appears to our minds in everyday experience as local and classical." (Kak, Chopra & Kafatos, 2014).

What, thus, accounts for this disparity in perception that limits human consciousness into constructing reality as localized space-time? Investigation into this phenomenon has only recently been explored by quantum theory and, to some extent, by the science of consciousness. Inquiry into the nature of cognitive perception is, however, not exclusive to the domain of modern science but was once an activity vigorously pursued in the ancient Indian philosophical texts of the Upanishads. One concept that appears to unite the ancient monistic philosophy of the Upanishads and quantum theory is the phenomenon of filtration—cognitive filtration for the Upanishads, quantum filtration for physics.

Quantum filtration, a term more commonly employed in the field of optics, also conveys a feature in quantum mechanics that is "designed to allow the passage of a particular quantum state and no other." (Roy & Kafatos 1999, p. 664). As will be discussed in greater detail in subsequent sections, the spiritual insights of the Upanishads surmised that the basis of human consciousness is also established in filtration. Specifically, the Upanishads present the view that the mind filters "reality" into a partial, incomplete simulation that we incorrectly identify as an accurate representation of the universe. This process of filtration, both quantum and cognitive, appears to be the reason why consciousness in ordinary everyday experience fails to perceive reality in its non-local, entangled state.

One possible explanation as to why the brain functions in this manner is what Hoffman (2008) refers to as the multimodal user interface (MUI) theory of perception. The theory offers an explanation as to why "perceptual experiences do not match or approximate properties of the objective world, but instead provide a simplified, species-specific, user interface to that world." (p. 87) In actuality, quantum theory asserts that while reality exists in a non-localized spatiotemporal continuum, certain neural mechanisms may account for the brain operating as an MUI. As a result, human cognition approximates, to the best of its ability, a simulation of reality that perceives time in a localized, finite, fragmented, and linear manner.

The concept of filtration is related to the tenet in quantum mechanics of complementarity and the interpretation of the wave function. Based on Heisenberg's Uncertainly Principle, it is not possible to determine the exact location of a particle in space-time until it is measured. Rather, a particle only has a probability distribution of its possible position within the wave

function. Only when the probability wave of potentiality collapses, does a particle become determined and measured in localized space-time.

This measurable and observable state of a particle that has collapsed from the wave function is known as its eigenstate. Discussing the concept of the eigenstate (or characteristic state) with regard to time, Joseph (2014) argues "Only when the object can be assigned a specific value as to location, or time, or momentum, does it possess an eigenstate, i.e. an eigenstate for position, or an eigenstate for momentum, or an eigenstate for time; each of which is a function of the 'reduction of the wave function;' also referred to as wave function collapse."

As it pertains to the concept of time, a particle within the wave function spans the entire temporal continuum, but only once the collapse of the wave function occurs, will the particle manifest in a specific eigenstate of time, i.e. in a measured and determined point in localized time.

With regard to the concept of complementarity, "Two observables are called complementary when a pure state cannot be a common eigenstate of both observables....Here, we suggest to regard this operational constraint, preventing the simultaneous assessment of two complementary perspectives, being caused by limited resources as in bounded rationality." (beim Graben & Blutner 2013, p. 1). In essence, conjugate pairs, e.g. wave and particle, operate in mutual exclusivity, yet also are complements to the other in order to describe all phenomenal aspects of reality. Complementarity appears to be a principle that manifests not only at the quantum realm, but one that the spiritual teachings of the Upanishads claim operates equally within the domain of cognition and perception. As Kafatos (2009) argues:

From the early quantum universe, it is likely that quantum-like effects are frozen into the structure of the universe and, therefore, pervasive at all scales in the universe. Complementarity and non-locality are two principles that apply beyond quantum microphysical scales (Kafatos, 1998; 1999) and as such may be considered to be universal foundational principles applying at all scales.

The question again arises why then do quantum phenomena, such as entanglement and non-locality, fail to manifest at the macro-scale level of human perception? The reason again relates to the concept of filtration, specifically the mechanisms of quantum and cognitive filtration that obscure and veil the underlying non-local, entangled character of the universe from

everyday consciousness.

2. Temporal Perception and Veiled Non-Locality

"The universe could only come into existence if someone observed it. It does not matter that the observers turned up several billion years later. The universe exists because we are aware of it." Martin Rees

Time is a concept that spans the human condition. In examining the human perception of time, Furey and Fortunato (2014) declare, "Psychological research shows that just about all of human experience is dependent upon and influenced by how individuals perceive time, localize themselves consciously within space and time, process their temporally-based perceptions and experiences." (p. 119). Classical physics has successfully allowed us to calculate and measure time at the macroscale, while relativistic physics demonstrates how time and space are conjugate pairs that manifest in a unified continuum. With the establishment of quantum mechanics, concepts such as entanglement and non-locality allow us to construct a new cosmological model of time that connects with cognitive perception—one that asserts that time is perceived in a complementary timeful and timeless state. In the timeful state, the mind perceives time in its localized, linear, and causal aspects; while in its timeless state as non-local, symmetrical, and entangled. Many of the spiritual traditions throughout history maintain a similar position of human consciousness as having the capacity to abide within these complementary modes of existence. According to quantum theory and the perennial philosophies, the localized qualities of time that exist within the classical realm and that the mind perceives to be real are, in essence, the result of a cognitive distortion.

Joseph (2014) advances how "time, and conceptions about the past, present or future are therefore illusions, as there is no 'future' or 'past'....However, when considered from the perspective of quantum mechanics, timespace is a continuum, a unity, and time does not exist independent of this continuum, except as an act of perceptual registration by consciousness or mechanical means." The recognition of the mind's ability to experience both the localized and non-localized complementary aspects of time was the impetus for the ancient Indian mystics to develop advanced mental techniques to master time within the domain of human consciousness. The goal of these disciplines was

to liberate from the inherent cognitive filters that limit one's consciousness into the distorted and fragmented perception of time. One such tactic that facilitated a temporal reframing of reality is kāla-vañcana "time-skewing." (White 1998, p. 154). A Sanskrit term first encountered in the Tantric traditions of medieval India, kāla-vañcana advances the cognitive ability for humans to transcend the confines of localized space-time and to expand the experience of time from the limited state of timefulness to its underlying state of timelessness.

The mechanism that reduces human consciousness into experiencing time in its temporally localized state is what is referred to as veiled non-locality. The term implies how "consciousness disguises its wholeness and nonlocality in order to produce local processes.... This filtering process allows for specific observations and thoughts in a classical world of everyday experience, while keeping quantum and general relativistic processes out of sight." (Kak, Chopra & Kafatos 2014).

Having outlined an overview of the quantum principles of filtration, complementarity, and non-locality, it is possible to apply these concepts into exploring the cognitive dimensions of reality and inquiring into the nature of time and consciousness—aspects that have been the foundation for many of the world's spiritual and mystical traditions. The paper now turns its focus onto one such particular period in history when investigations into the realm of human consciousness became the cornerstone of an entire philosophical and religious movement.

3. The Upanishads

"I go into the Upanishads to ask questions." Neils Bohr

The ancient philosophers and spiritual adepts of India millennia ago revealed what modern science has only recently affirmed—human perception is capable of experiencing cognitive limitations and creating cognitive illusions. The greatest and most persistent illusion, according to the Indian mystics, was experiencing reality via a cognitive filter of finitude, locality, separation, and duality. One primary aim in life, according to the ancient mystics who composed the Upanishads, was to alter one's cognitive perspective to perceive reality in its revealed state of transcendence, non-locality, wholeness, and unity.

Spanning a period ca. 800-200 BCE, the Upanishads are a collection of orally composed sacred texts that constitute a highly detailed and complex discussion of philosophy and metaphysics in Indian literature. While the Vedic corpus, texts dating nearly a 1,000 years prior to the Upanishads, explores notions of cosmology, time, and consciousness, the Upanishads usher in the first literary period in India when such concepts were the primary and central theme of investigation. The Upanishads mark the pivotal transition from the earlier ritualism of the Vedic religion to the establishment of core principles evident in Classical Hinduism. In addition to developing tools for psycho-spiritual mastery, concepts such as karma, reincarnation, yoga, and monism, are all witnessed in the Upanishads.

Specifically, with regard to quantum theory I propose that the teachings of the Upanishads can be summarized into centering around three key points:

1) There exists a transcendental, infinite, non-local, dimensionless, unchanging reality that is obscured from the limited cognitive perception of the human senses.
2) This foundational reality is veiled by means of a cognitive illusion that limits consciousness into a localized, linear, and dimensionally finite perception of time.
3) Advanced mental trainings were developed and practiced in order to liberate one's consciousness from the illusory cognitive limitations of the mind via a perceptual reframing of time into its fundamental non-local, entangled state.

Given the many conceptual parallels between early Indian philosophy and quantum theory, it comes as no surprise that many of the founders of quantum physics, e.g. Bohr, Schrödinger, Heisenberg, were well-versed in, if not heavily influenced by, the sacred wisdom contained within the Upanishads. As Schrödinger famously quotes, "The multiplicity is only apparent. This is the doctrine of the Upanishads. And not of the Upanishads only. The mystical experience of the union with God regularly leads to this view, unless strong prejudices stand in the way."

The "strong prejudices" to which Schrödinger refers are the cognitive biases and filters upon which we experience reality and frame consciousness. Once this deceptive and limiting cognitive frame of reality (perceived as

localized space-time) is followed as the basic nature of existence, it becomes the core, the cause, and the continuity of human suffering. The teachings of the Upanishads state that in order to be liberated from the bonds of ignorance and illusion, one had to identify and dismantle the cognitive barriers that prevented one from achieving a unitive state of consciousness.

The common Western perspective is to view the function of religion primarily to regulate the intimate relationship of humankind with a separately existing cosmic divinity. In the Advaita Vedanta branch of the Hindu traditions, as primarily evident in the Upanishadic texts, they place the individual not apart from the cosmic divine, but co-existent in an integrated relationship within a much greater whole. This notion of unity, interconnectedness, and wholeness among all the constituent parts of the universe, is a cognitive metaphor spanning the multitudinous traditions within the 5,000 years of spiritual, religious, philosophical, and social dimensions of Indian thought (Kumar, 2010).

Underscoring this ancient Indian perspective of humanity abiding in cosmic unity and harmony, Olivelle (2008) posits in his commentary of the Upanishads, "The assumption then is that the universe constitutes a web of relations, that things that appear to stand alone and apart are, in fact, connected in other things. A further assumption is that these real cosmic connections are usually hidden from the view of ordinary people; discovering them constitutes knowledge, knowledge that is secret and is contained in the Upanishads." (lii).

One such "secret knowledge" advanced in certain texts of the Upanishads is the fundamental concept that the very fabric of the universe is based in consciousness. This concept is outlined in a passage from the Aitareya Upanishad:

"Consciousness is everything. The world comes after consciousness; and it is here, in consciousness, that all the world is found to stand. From consciousness is all there is. One who knows self as consciousness has risen, from the seeming world, to this unconditioned state where everything is only light. Here, all desires are attained, and deathlessness is realized." (Aitareya Upanishad III 1, 3-4)

4. Ātman and Brahman as Complementary States of Consciousness

"God is the tangential point between zero and infinity." Alfred Jarry

Perhaps the most transformational and powerful concept that the Upanishads introduce to Indian philosophy and to humanity is the concept of Brahman. Deriving from the Sanskrit verbal root bṛh"to swell, expand," the Upanishads depict Brahman as the dimensionless, non-local, transcendent, infinite state of consciousness. While the notion of Brahman resides at the philosophical core of the Upanishads, it has a semantic analogue dating back centuries earlier to the sacred text of the Ṛgveda, in which the Upanishadic notion of Brahman conceptually augments the Sanskrit terms sarva "wholeness" and ṛta "cosmic harmony" evidenced in the earlier Vedic religion (Kumar, 2014).

According to the Upanishads, Brahman has no gender, form, and is imperceptible to the five senses. The only way in which Brahman can be "perceived" is through cognitive awareness, as Brahman Itself is pure consciousness. This goal of the Upanishads, while elegant in its simplicity, was complex in its actualization: to achieve a cognitive state of unity with the transcendental, timeless dimension of reality, Brahman. Drawing a conceptual parallel between Brahman and quantum non-locality, Laszlo (2007) writes:

The Indian Vedic tradition, for example, regards consciousness not as an emergent property that comes into existence through material structures such as the brain and the nervous system, but as a vast field that constitutes the primary reality of the universe. In itself, this field is unbounded and undivided by objects and individual experiences...underlying the diversified and localized gross layers of ordinary consciousness there is a unified, nonlocalized, and subtle layer: 'pure consciousness.' (p. 120).

While Brahman constitutes the dimensionless, non-local state of pure consciousness, it manifests into the localized realm of space-time, as individuated, discrete manifestations of consciousness, known as Ātman. While the closest metaphysical analogue of Ātman in western thought might be a soul, the Upanishads are clear in stating that the individuated forms of Ātman that reside in all living beings are, in actuality, Brahman. Discussing

the nature and quality of the Ātman, the Katha Upanishad declares,

"The knowing Self [Ātman] is never born; nor does it die at any time. It has sprung from nothing; nothing has sprung from it. Birthless, eternal, everlasting, and primeval. It is not killed when the body is killed." (Katha Upanishad I 2,18).

Reflecting upon the inherent qualities of the individuated Ātman, the Upanishads, thus, proclaim that it is the essential inner reality within everyone. Furthermore, the great philosophers of the Upanishads arrived at the transformative realization that Ātman and Brahman were one and the same.

Within the theoretical framework of quantum mechanics, every single ātman can be conceptualized as a localized, observable, measurable state of the indeterminate, potentiality of Brahman. Furthermore, Brahman and Ātman can be viewed as complementary states of consciousness—Brahman being the transcendent, non-local aspect of consciousness and ātman as the immanent, localized aspect of consciousness. Thus, the mystic seers of the Upanishads conceptualized Ātman and Brahman as co-existing in a state of spatiotemporal complementarity. While the Ātman manifests as an individual consciousness in a specific place and time, it is in essence the complementary counterpart of the timeless and dimensionless Brahman.

It is equally possible to contextualize the concepts of Brahman and Ātman within the quantum framework of the wave function. As Joseph (2014) posits, "The wave function is the particle spread out over space and describes all the various possible states of the particle. Likewise, the wave function would describe all the various possible states of time, including past, present, and future." In the same manner that quantum mechanics regards the wave function as providing a particle with the potentiality to manifest in any possible spatiotemporal, localized state of existence, the Upanishads conjecture that the non-local aspect of Brahman is the unmanifested state of reality that contains the infinite and various possible states of Ātman across the space-time continuum. In this manner, Brahman behaves as the quantum wave function, whereas Ātman represents the collapsed measurement of the wave function in localized reality.

The goal of the teachings in the Upanishads resides in the conceptualization

that the limited and localized consciousness of Ātman functions in complementarity with the nonlocalized, universal consciousness of Brahman. This cognitive awareness leads one to the path of spiritual liberation and everlasting peace. Emphasizing this fundamental truth, the ancient Indian sages encapsulated this concept into key phrases, known as the four māhavākya "great sayings," that elegantly express the heart of Upanishadic philosophy.

Aham Brahmāsmi "I Am Brahman" (Bṛhadaranyaka Upanishad I 4,10) Prajñānam Brahmā "Conscious Knowledge Is Brahman" (Aitareya Upanishad III 1,3) Tat Tvam Asi "That [Brahman] You Are" (Chhāndogya Upanishad VI 8,7) Ayam Atmā Brahmā "This Ātman Is Brahman" (Mandukya Upanishad I 2)

Collectively, these four aphorisms synthesize the core tenet of the Upanishads that can be structured into a simple algebraic equation: A(tman) = B(rahman).

5. Māyā, Moksha, and Cognitive Non-Locality

"I sing the body that is electric! I celebrate the Self yet to be unveiled!" Walt Whitman

It now becomes evident how in general much of "Indian philosophy regards the timeless realm as more real than the manifested realm confined by time and space and says the task of conscious beings is to discover that timelessness and give up any hold it has on the time-spacematter universe." (Wolf 2004, p. 205). While attaining this cognitive state was achievable, the primary obstacle to experiencing the "timeless realm" where A = B is the cognitive impediment of māyā.

The Sanskrit term māyā developed a multiplicity of meaning within the 4,000 years of Indian literature. In the earliest texts of the Vedic religious corpus, the term conveyed the sense of "magic, art, craft, and power" that explained the numinous qualities of the universe (Mahony 1997, p. 6). In the later monistic philosophy of the Upanishads and the subsequent Advaita Vedānta school, māyā developed the more specialized meaning as "the

illusory veil" that envelopes and apportions consciousness into the phenomenological, physical world that parallels Kafatos' and Kak's concept of veiled non-locality.

In order to elucidate how the term māyā semantically evolved to convey the concept of illusion, it is important to discuss its etymological roots. The online Monier-Williams SanskritEnglish dictionary identifies numerous meanings for Sanskrit māyā, translations of which include "illusion, unreality, deception, fraud, trickery, sorcery, witchcraft, magic." Despite the semantic multivalency of the term māyā, its essential meaning can be gleaned by examining the Sanskrit verb from which the word derives. The etymological origin of māyā points back to the Sanskrit verbal root mā"to measure, limit, apportion, mete out." Taken in this semantic context, I propose that a more nuanced translation for māyā is conveyed by English limitation.

More precisely, māyā can be contextualized within the framework of Brahman and Ātman as a cognitive filtration that limits one's consciousness from perceiving the fundamental nature of the universe and that filters the undivided, non-local, dimensionless state of potentiality known as Brahman into a limiting, dualistic fragmented vision of reality. The term māyā is semantically connected with Sanskrit avidyā "ignorance"—expressing one's "ignorance of the unitary character of the ultimate reality" (Jones & Ryan 1997, p. 282) that exists in a state of spatiotemporal non-locality. Thus, māya is a form of existential ignorance that veils the mind from perceiving reality as a non-local, unbounded continuum. As Kak, Chopra, Kafatos, (2014) advance,

The veiling of reality is in consonance with the idea of the mind constructing its reality. Such a veiling even occurs in the scientific process which filters out and discards a huge portion of human experience -almost everything one would classify as subjective. Its model is just as selective, if not more so, than the model which shapes a religious or metaphysical reality. As far as the brain is concerned, neural filtering is taking place in all models, whether they are scientific, spiritual, artistic, or psychotic. The brain is a processor of inputs, not a mirror to reality.

As previously outlined, when an individual's consciousness is established in a cognitive framework where A = B, the Upanishads declare that realization becomes the basis to experience life via truth, knowledge, and,

most importantly, the freedom from suffering. However, the primary cause of human suffering is the product of a cognitive state of ignorance and limitation, by which A ≠ B, i.e. a mode of human consciousness grounded in māyā.

Another important philosophical term in the monistic Advaita Vedanta tradition is moksha (mokṣa) “liberation” that derives from the Sanskrit verb muc“to release, liberate.” In the most literal sense, moksha is the act of releasing oneself from the cycles of death and rebirth within the Classical Indian framework of reincarnation. More precisely, moksha is the vehicle of cognitive liberation from the illusory limitations of māyā that breaks the cycles of human suffering and ignorance, ultimately unifying Ātman with Brahman. The following excerpt from the Upanishads reflects this point stating, “By meditating on [Brahman], by striving towards [Brahman], and, further, in the end by becoming the same reality as [Brahman], all illusion disappears. By knowing [Brahman], there is a falling away of all fetters; when the sufferings are destroyed, there is cessation of birth and death.” (Śvetāśvatara Upanishad I, 10-11).

On a side note, the Hindu concept of moksha has a striking religious parallel to the Christian concept of salvation and being freed from sin, as evident in the Biblical terms revelation and apocalypse. In the same manner that the Sanskrit word moksha connotes the “actof liberating oneself from the limited and veiled illusion of reality,” Latin revelatiō and Greek apokalypsis both convey the meaning “to reveal, to unveil” what is hidden and obscured from human perception. While certain Biblical interpretations advocate that humanity suffers due to being born into a state of sin, the Upanishads and later Hindu philosophy advance the view that humans suffer, due to our being born into a cognitive state of māyā. This cognitive limitation binds human consciousness and the Ātman into a measured, finite, conditioned perception of space-time as being local and linear.

Referring back to the earlier equation, expressing that the goal in the Upanishads is to abide in a cognitive state in which A = B, the concepts of māyā and moksha can be contextualized within quantum theory and summarized in the following manner.

Cognitive State	Conceptual State	Conditional State	Complementary State
A ≠ B	*Māyā*	Limitation	Locality
A = B	*Moksha*	Liberation	Non- Locality

6. Happiness as Temporal Non-Locality

"If you are depressed you are living in the past, if you are anxious you are living in the future, if you are at peace you are living in the present." Lao Tzu

On the surface, it might appear peculiar for a highly advanced and deeply philosophical system to focus on the nature of happiness. The bias perhaps resides in the semantic expression of the English word happiness. It is predominantly the assumption that in the realm of the western psyche happiness is an emotional state that is finite and fleeting. Contrary to this belief, the philosophers of the Upanishads conceived of happiness not as an emotional, but as an existential, state of awareness and being. A common term found in the Upanishads to convey the concept of happiness is the Sanskrit term sukha. While the word sukha is often translated as happiness, it encompasses a wider semantic sphere that equally connotes the human feeling of "contentment, ease, peace." According to the Upanishads, embodying a sustained state of sukha was actually an important aim for humans to achieve.

The philosophers of the Upanishads conceived of happiness not as a fleeting state free from emotional or physical pain, but as a sustained state free from psycho-spiritual suffering. The means to achieve this state of inner contentment and equanimity was in dispelling the cognitive limitations of māyā and experiencing the liberated state of moksha. This transformation from māyā to moksha was established in the capacity to shift one's perception of reality from a local, finite state to a non-local, infinite state of consciousness. It is within this cognitive frame that an ontological perspective of human existence was conceived millennia ago, which conceptually defines happiness in the Upanishads as the absence of existential suffering that results when the mind perceives reality within a state of temporal non-locality.

Furthermore, the ancient sages advanced the point that pleasure was not the same as happiness, as the following passage from the Katha Upanishad suggests: "There is the path of happiness, and there is the path of pleasure.

Both attract the soul. Who follows the first comes to good; who follows the path of pleasure fails to reach the end goal. The two paths lie in front of man. Discriminating between them the wise one chooses the path of happiness; the simpleminded takes the path of pleasure." (Katha Upanishad I 2, 1-2). This differentiation between happiness and pleasure that the Upanishads outline ultimately relates to the concept of human suffering, desires, and wants.

The Upanishads elaborate upon the notion of māyā semantically relating it to the Sanskrit term tṛṣṇā, the "thirsts, cravings, and desires" that result from a life established in the pursuit of pleasure and the avoidance of pain. The commentaries on the Upanishads further state that a life driven by pleasure sows duḥkha-bīja "the seeds of sorrow" that imprison our consciousness into a temporal state of finitude and an erroneous existential state of separation from Brahman. In this context, the Upanishads posit a clear distinction between a life focused in the aim of pleasure and one in the attainment of happiness. For those following a life of pleasure over that of happiness, the end goal of moksha and the liberation from māyā cannot be attained. The question arises as to what exactly constitutes pleasure versus happiness. The Upanishads advance a unique and powerful notion that the qualitative distinction between pleasure and happiness resides within a temporal context.

To illustrate this point, a well-known story in the Chhāndogya Upanishad has Śvetaketu asking his father about the meaning of life and the attainment of happiness.

'Everyone is seeking happiness. What is happiness?' Śvetaketu asked his father this question, long ago. His father replied 'One sign of happiness is that one who has it is active. One who does not have it, is not active. His/her mind will be cramped and weak. In the finite, there is no happiness. So you must desire to understand the Infinite.' The boy wanted to know how to understand the Infinite. Father said 'Listen well to what I say and think deeply about it. When a person sees that nothing and no one is separate from oneself, that one is as one with all people, animals and objects. When one knows, sees and hears nothing else, that is the Infinite. But if one sees or feels some other thing, obstructing or separating oneself, then that is the finite. Then one has not found the Infinite. The finite is transient; the Infinite is eternal. Knowledge of the Infinite gives everlasting happiness.' (Chhāndogya Upanishad VII 22-24)

When the philosophers of the Upanishads state that "knowledge of the Infinite gives everlasting happiness," they again refer to happiness being primarily an existential state of perception. A common motif throughout the Upanishads is the recognition that consciousness, space, and time are all multiple concepts that simultaneously express reality. From a temporal perspective, abiding in the limited cognitive state of transience, finitude and locality, i.e. māyā, traps one in an illusory life of pleasure that ultimately leads to suffering. Our consciousness becomes deluded when it is filtered into and imprisoned within the localized, finitude of māyā, preventing one from experiencing ultimate happiness. Once consciousness becomes liberated via a cognitive reframing of reality, one attains moksha. As the Upanishads convey, the moment we perceive reality in its primary non-local, infinite state of unity, the result is happiness.

The Upanishadic philosophers devised many rhetorical arguments to assert that our fundamental essence is happiness. This state of happiness is the result of a cognitive transformation from the delusional limitations of māyā that reinforce our separation from the transcendental consciousness of Brahman. The world of māyā is finite, experienced as temporal locality, and perpetuated by a life pursued by pleasure. In order to experience genuine happiness, one must first abide in a state of mind that equates one's individuated Ātman with Brahman. Another passage further underscores the notion that happiness is an existential state of timeless, unchanging continuity.

It is each being's inner self, the single guiding principle that makes from its own unity the many seeming things of world. It's known by those who see it as it is: already standing here, as one's own self. Just this, and from only this, brings lasting happiness. In things that change, it is that continuity which does not change. In conscious things, it is the consciousness that's common to them all. Among the many, it is one: the undivided unity where all desire is fulfilled. It's known by those who see it as it is: already standing here, as one's own self. Just this, and nothing else but this, brings lasting peace. It's found by seeing 'that out there' as nothing else but 'this in here'; and coming thus to happiness, unlimited and objectless. (Katha Upanishad 5.12-13)

The Upanishadic concept of happiness is one that is intimately linked to a state of temporal nonlocality. These concepts can now be integrated within a

larger framework in the following manner.

Cognitive State	Conceptual State	Conditional State	Complementary State	Temporal State	Expressed State
A ≠ B	*Māyā*	Limitation	Locality	Finite	Pleasure
A = B	*Moksha*	Liberation	Non-Locality	Infinite	Happiness

7. Conclusion

As Kafatos and Kak exclaim, "If these principles [of neural filtration] did not exist, a very strange, globally-entangled, singularities-rich reality would exist, beyond the limits of any epistemology and ontology that we can imagine and even violating everyday experience. No observations of distinct objects, no scientific theories and, ultimately, no distinct conscious observers, can be conceived in this situation." (pp. 6-7). The spiritual teachers of the Upanishads were largely disinterested in sacred ritual and practice of divine worship. Among the advancements the Upanishads contributed in the realm of philosophy and metaphysics dating back millennia, the composers of these texts investigated the complex nature of human consciousness. They, furthermore, endeavored to explain the factors that led to and provide the solutions to liberate from the existential suffering perpetuated by māyā. According to the various teachings in the Upanishads, space and time are illusory constructs that skew one's state of consciousness and limit one's cognitive perception of reality. The fundamental philosophical motif pervasive in the Upanishads is the advancement that cognitive limitations (māyā) lead to cognitive delusions (suffering).

The psycho-spiritual vehicle of kāla-vañcana expressed that the solution to liberate from suffering resides in skewing one's temporal perception of reality. This altered state of transformation, known as moksha, occurs upon the revelation that one's individuated Ātman is identical with Brahman. In this way, the core tenets of quantum theory align with the sacred wisdom outlined in the Upanishads—Ātman and Brahman are complementary states of consciousness that simultaneously manifest as temporal locality and non-locality.

The Upanishads further sought to explore the correlations between temporal perception and the human quality of sukha, an embodied state of "happiness" expressed by inner contentment, existential peace, and spiritual equanimity. The Sanskrit phrase nālpe sukham asti bhumaiva sukham underscores the

notion that “in the finite there is no happiness, only in the infinite is there happiness.” (Chhāndogya Upanishad VII 23) Simply stated, happiness is contingent upon perceiving one’s Ātman as either being separate from or united with the transcendent, non-local reality of Brahman. When the mind filters reality through a temporal state of finitude and locality, this becomes the source of our unhappiness. Conversely, when established in a non-local state of unitive consciousness, one experiences a deeply embodied state of sukha, an existential state of happiness that transcends the fleeting feelings of both pleasure and pain.

It is a valid point that the noted 20th century spiritual teacher, Shri Chinmoy, outlines in his commentaries on the Upanishads by elegantly summarizing,

“Anything that is finite cannot embody happiness, not to speak of lasting delight. The finite embodies pleasure, which is not true happiness. The Infinite embodies true divine happiness in infinite measure, and, at the same time, it reveals and offers to the world at large its own truth, its own wealth.”

While the science of consciousness and quantum theory are scientific disciplines that have only been recently advanced in the past century, the perennial spiritual wisdom of the Upanishads construct a revolutionary model of reality that views time, consciousness, and the mind as interdependent, co-extensive phenomena. While temporal qualia enable us to experience time in a personally, subjective way, present day models of quantum theory and emerging models of consciousness appear to align with the vastly ancient teachings from the Upanishads to construct a radically innovative conceptualization of time. In this sense, science and spirituality are deeply and powerfully interrelated and complementary worldviews that transcend our perception of time and reveal the nature of reality via a mode of consciousness that is, and will always be, timeless.

REFERENCES

beim Graben, P. and Blutner, R. (2013). Complementarity in cognition entailed by bounded rationality. Talk presented at Fechner Day 2013, October 21 – 25, Freiburg i.Br.

Chopra, D., Kafatos M., Tanzi R. (2011). How consciousness becomes the physical universe. Cosmology, vol. 14. (online) Furey, J. and Fortunato, V.

(2014). The Theory of MindTime. Cosmology, vol. 18, 231-245.

Hoffman, D. (2008). Conscious realism and the mind-body problem. Mind & Matter, vol. 6(1), 87-121.

Jones, C. and Ryan, J. (2007). Encyclopedia of Hinduism. Facts on File Press.

Joseph, R. (2014) Paradoxes of Time Travel: The Uncertainty Principle, Wave Function, Probability, Entanglement, and Multiple Worlds. Cosmology, vol. 18. 283-302.

Kafatos, M. and Kak, S. (2014). Veiled nonlocality and cosmic censorship (arXiv:1401.2180).

Kak, S., Chopra, D., and Kafatos, M. (2014) Perceived Reality, Quantum Mechanics, and Consciousness. Cosmology, vol. 18. 231-245.

Kumar, J. (2010). Cognitive and Cultural Metaphors of Wholeness in the Ṛgveda. PhD diss., California Institute of Integral Studies, San Francisco, US

Kumar, J. (2014). Ayurveda & early Indian medicine. In: Johnston, L., Bauman, W. (Eds.), Science and Religion: One Planet, Many Possibilities (Routledge Studies in Religion), Routledge Press, Oxford, UK., pp. 174-185.

Laszlo, E. (2007). Science and the Akashic Field. Inner Traditions Press, Rochester, Vermont, US.

Mahony, W. (1997). The Artful Universe: An Introduction to the Vedic Religious Imagination, State University of New York Press, Albany, NY, US

Olivelle, P. (2008). Upaniṣhads (Oxford World's Classics). Oxford University Press, Oxford, UK.

Roy, S. and Kafatos, M. (1999). Complementarity Principle and Cognition Process. Physics Essays volume 12, number 4, 662-668.

Traunmüller, H. (1998). Measuring time and other spatio-temporal quantities. Apeiron, vol. 5 Nr. 3-4, July-October 1998, 213-218.

White, D. (1998). The Alchemical Body: Siddha Traditions in Medieval India, University of Chicago Press, Chicago, US.

Wolf, F. A. (2004). The Yoga of Time Travel. Quest Books, Wheaton, IL, US.

37. Quantum Physics and the Multiplicity of Mind: Split-Brains, Fragmented Minds, Dissociation, Quantum Consciousness

R. Joseph, Ph.D.
Cosmology.com
Emeritus, Brain Research Laboratory, Northern California

Abstract

Quantum physics and Einstein's theory of relativity make assumptions about the nature of the mind which is assumed to be a singularity. In the Copenhagen model of physics, the process of observing is believed to effect reality by the act of perception and knowing which creates abstractions and a collapse function thereby inducing discontinuity into the continuum of the quantum state. This gives rise to the uncertainty principle. Yet neither the mind or the brain is a singularity, but a multiplicity which include two dominant streams of consciousness and awareness associated with the left and right hemisphere, as demonstrated by patients whose brains have been split, and which are superimposed on yet other mental realms maintained by the brainstem, thalamus, limbic system, and the occipital, temporal, parietal, and frontal lobes. Like the quantum state, each of these minds may also become discontinuous from each other and each mental realm may perceive their own reality. Illustrative examples are detailed, including denial of blindness, blind sight, fragmentation of the body image, phantom limbs, the splitting of the mind following split-brain surgery, and dissociative states where the mind leaves the body and achieves a state of quantum consciousness and singularity such that the universe and mind become one.

1. Introduction

In 1905 Albert Einstein published his theories of relativity, which promoted the thesis that reality and its properties, such as time and motion had no objective "true values", but were "relative" to the observer's point of view (Einstein, 1905a,b,c). However, what if the observer is not a singularity and has more than one point of view and more than one stream of observing consciousness? And what if these streams of consciousness were also relative?

Quantum physics, as exemplified by the Copenhagen school (Bohr, 1934,

1958, 1963; Heisenberg, 1930, 1955, 1958), also makes assumptions about the nature of reality as related to an observer, the "knower" who is conceptualized as a singularity. Because the physical world is relative to being known by a "knower" (the observing consciousness), then the "knower" can influence the nature of the reality which is being observed. In consequence, what is known vs what is not known becomes relatively imprecise (Heisenberg, 1958).

For example, as expressed by the Heisenberg uncertainty principle (Heisenberg, 1955, 1958), the more precisely one physical property is known the more unknowable become other properties, whose measurements become correspondingly imprecise. The more precisely one property is known, the less precisely the other can be known and this is true at the molecular and atomic levels of reality. Therefore it is impossible to precisely determine, simultaneously, for example, both the position and velocity of an electron.

However, we must ask: if knowing A, makes B unknowable, and if knowing B makes A unknowable, wouldn't this imply that both A and B, are in fact unknowable? If both A and B are manifestations of the processing of "knowing," and if observing and measuring can change the properties of A or B, then perhaps both A and B are in fact properties of knowing, properties of the observing consciousness, and not properties of A or B.

In quantum physics, nature and reality are represented by the quantum state. The electromagnetic field of the quantum state is the fundamental entity, the continuum that constitutes the basic oneness and unity of all things.

The physical nature of this state can be "known" by assigning it mathematical properties (Bohr, 1958, 1963). Therefore, abstractions, i.e., numbers, become representational of a hypothetical physical state. Because these are abstractions, the physical state is also an abstraction and does not possess the material consistency, continuity, and hard, tangible, physical substance as is assumed by Classical (Newtonian) physics. Instead, reality, the physical world, is created by the process of observing, measuring, and knowing (Heisenberg, 1955).

Consider an elementary particle, once this positional value is assigned, knowledge of momentum, trajectory, speed, and so on, is lost and becomes "uncertain." The particle's momentum is left uncertain by an amount inversely proportional to the accuracy of the position measurement which is

determined by values assigned by the observing consciousness. Therefore, the nature of reality, and the uncertainty principle is directly affected by the observer and the process of observing and knowing (Heisenberg, 1955, 1958).

The act of knowing creates a knot in the quantum state; described as a "collapse of the wave function;" a knot of energy that is a kind of blemish in the continuum of the quantum field. This quantum knot bunches up at the point of observation, at the assigned value of measurement.

The process of knowing, makes reality, and the quantum state, discontinuous. "The discontinuous change in the probability function takes place with the act of registration…in the mind of the observer" (Heisenberg, 1958).

Reality, therefore, is a manifestation of alterations in the patterns of activity within the electromagnetic field which are perceived as discontinuous. The perception of a structural unit of information is not just perceived, but is inserted into the quantum state which causes the reduction of the wave-packet and the collapse of the wave function.

Knowing and not knowing, are the result of interactions between the mind and concentrations of energy that emerge and disappear back into the electromagnetic quantum field.

However, if reality is created by the observing consciousness, and can be made discontinuous, does this leave open the possibility of a reality behind the reality? Might there be multiple realities? And if consciousness and the observer and the quantum state is not a singularity, could each of these multiple realities also be manifestations of a multiplicity of minds?

Heinserberg (1958) recognized this possibility of hidden realities, and therefore proposed that the reality that exists beyond or outside the quantum state could be better understood when considered in terms of "potential" reality and "actual" realities. Therefore, although the quantum state does not have the ontological character of an "actual" thing, it has a "potential" reality; an objective tendency to become actual at some point in the future, or to have become actual at some point in the past.

Therefore, it could be said that the subatomic particles which make up reality, or the quantum state, do not really exist, except as probabilities. These "subatomic" particles have probable existences and display tendencies to assume certain patterns of activity that we perceive as shape and form. Yet,

they may also begin to display a different pattern of activity such that being can become nonbeing and thus something else altogether.

The conception of a deterministic reality is therefore subjugated to mathematical probabilities and potentiality which is relative to the mind of a knower which effects that reality as it unfolds, evolves, and is observed (Bohr 1958, 1963; Heisenberg 1955, 1958). That is, the mental act of perceiving a non-localized unit of structural information, injects that mental event into the quantum state of the universe, causing "the collapse of the wave function" and creating a bunching up, a tangle and discontinuous knot in the continuity of the quantum state.

Einstein ridiculed these ideas (Pais, 1979): "Do you really think the moon isn't there if you aren't looking at it?"

Heisenberg (1958), cautioned, however, that the observer is not the creator of reality: "The introduction of the observer must not be misunderstood to imply that some kind of subjective features are to be brought into the description of nature. The observer has, rather, only the function of registering decisions, i.e., processes in space and time, and it does not matter whether the observer is an apparatus or a human being; but the registration, i.e., the transition from the "possible" to the "actual," is absolutely necessary here and cannot be omitted from the interpretation of quantum theory."

Shape and form are a function of our perception of dynamic interactions within the continuum which is the quantum state. What we perceive as mass (shape, form, length, weight) are dynamic patterns of energy which we selectively attend to and then perceive as stable and static, creating discontinuity within the continuity of the quantum state. Therefore, what we are perceiving and knowing, are only fragments of the continuum.

However, we can only perceive what our senses can detect, and what we detect as form and shape is really a mass of frenzied subatomic electromagnetic activity that is amenable to detection by our senses and which may be known by a knowing mind. It is the perception of certain aspects of these oscillating patterns of continuous evolving activity, which give rise to the impressions of shape and form, and thus discontinuity, as experienced within the mind.

This energy that makes up the object of our perceptions, is therefore but an aspect of the electromagnetic continuum which has assumed a specific

pattern during the process of being sensed and processed by those regions of the brain and mind best equipped to process this information.

Perceived reality, therefore, becomes a manifestation of mind.

However, if the mind is not a singularity, and if we possessed additional senses or an increased sensory channel capacity, we would perceive yet other patterns and other realities which would be known by those features of the mind best attuned to them. If the mind is not a singularity but a multiplicity, this means that both A and B, may be known simultaneously.

2. Duality vs Multiplicity

In the Copenhagen model, the observer is external to the quantum state the observer is observing, and they are not part of the collapse function but a witness of it (Bohr, 1958, 1963; Heisenberg 1958). However, if the Copenhagen model is correct, and as the cosmos contains observers, then the standard collapse formulation can not be used to describe the entire universe as the universe contains observers (von Neumann, 1932, 1937).

Further, reality becomes, at a minimum, a duality (observer and observed) with the potential to become a multiplicity.

As described by DeWitt and Graham (1973; Dewitt, 1971), “This reality, which is described jointly by the dynamical variables and the state vector, is not the reality we customarily think of, but is a reality composed of many worlds. By virtue of the temporal development of the dynamical variables the state vector decomposes naturally into orthogonal vectors, reflecting a continual splitting of the universe into a multitude of mutually unobservable but equally real worlds, in each of which every good measurement has yielded a definite result and in most of which the familiar statistical quantum laws hold.”

The minimal duality is that aspect of reality which is observed, measured, and known, and that which is unknown.

However, this minimal duality is an illusion as indicated not only by the potential to become multiplicity, but by the nature of mind which is not a singularity (Joseph, 1982, 1986a; 1988a,b).

Even if we disregard the concept of “mind” and substitute the word “brain”, the fact remains that the brain is not a singularity. The human brain is functionally specialized with specific functions and different mental states localized to specific areas, each of which is capable of maintaining independent and semi-independent aspects of conscious-awareness (Joseph

1986a,b, 1988a,b, 1992, 1999a). Different aspects of the same experience and identical aspects of that experience may be perceived and processed by different brain areas in different ways (Gallagher and Joseph, 1982; Joseph 1982; Joseph and Gallagher 1985; Joseph et al., 1984).

Therefore, although it has been said that orthodox quantum mechanics is completely concordant with the defining characteristics of Cartesian dualism, this is an illusion. Cartesian duality assumes singularity of mind, when in fact, the overarching organization of the mind- and the brain- is both dualistic and multiplistic.

If quantum physics is "mind-like" (actual/operational at the quantum level, but mentalistic on the ontological level) then quantum physics, or rather, the quantum state (reality, the universe) is not a duality, but a multiciplicity. Indeed, the entire concept of duality is imposed on reality by the dominant dualistic nature of the brain and mind which subordinates not just reality, but the multiplicity of minds maintained within the human brain (Joseph, 1982).

Like the Copenhagen school, Von Neumann's formulation of quantum mechanics (1932, 1937), fails to recognize or understand the multiple nature of mind and reality. Von Neumann postulated that the physical aspects of nature are represented by a density matrix. The matrix, therefore, could be conceptualized as a subset of potential realities, and that by averaging the values of these evolving matrices, the state of the universe and thus of reality, can be ascertained as a unified whole. However, in contrast to the Copenhagen interpretation, Von Neumann shifted the observer (his brain) into the quantum universe and thus made it subject to the rules of quantum physics.

Ostensibly and explicitly, Von Neumann's conceptions are based on a conception of mind as a singularity acting on the quantum state which contains the brain. Von Neumann's mental singularity, therefore, imposes itself on reality, such that each "event" that occurs within reality, is associated with one specific experience of the singularity-mind. Thus, Von Neumann assumes the brain and mind has only "one experience" which corresponds with "one event;" and this grossly erroneous misconception of the nature of the brain and mind, unfortunately, is erroneously accepted as fact by most cosmologists and physicists. Further, he argues that in the process of knowing, the quantum state of this singularity brain/mind also

collapses, or rather, is reduced in a mathematically quantifiable manner, just as the quantum universe is collapsed and reduced by being known (Von Neumann, 1932, 1937).

However, the brain and mind are not a singularity, but a multiplicity (Joseph, 1982, 1988a,b, 1999a). Nevertheless, Von Neumann's conceptions can be applied to the multiplicity of mind/brain when each mental realm is considered individually as an interactional subset of the multiplicity.

3. The Multiplicity of Mind and Perception

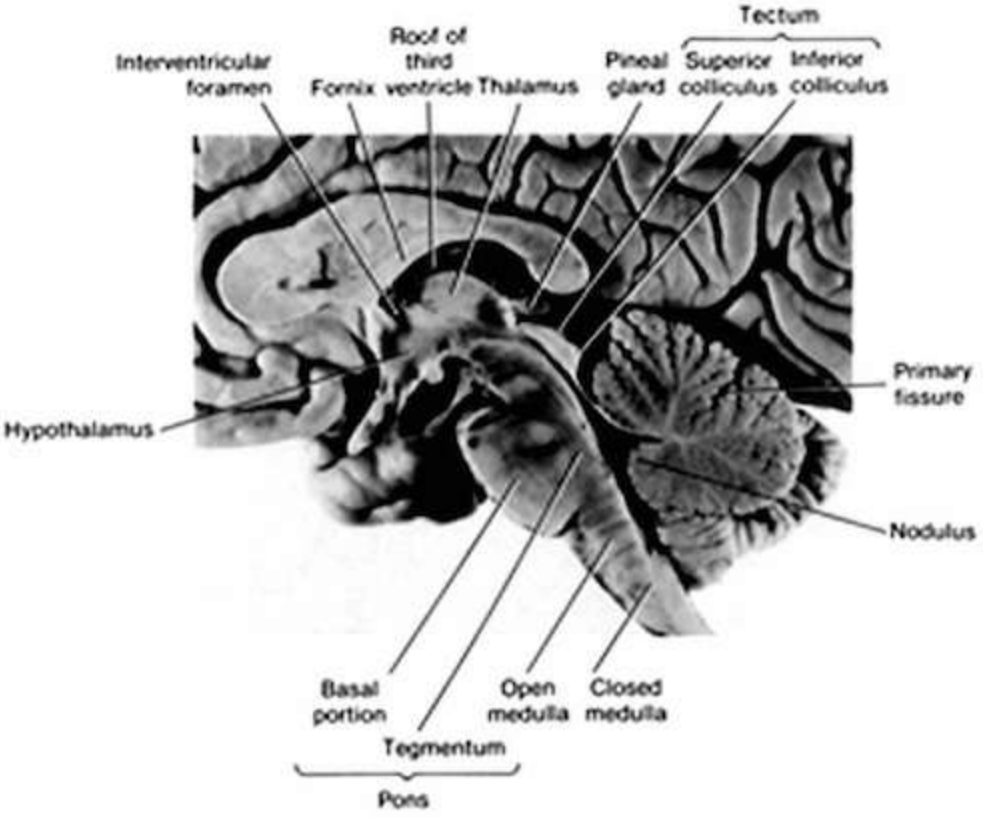
According to Von Neumann (1932), the "experiential increments in a person's knowledge" and "reductions of the quantum mechanical state of that person's brain" corresponds to the elimination of all those perceptual functions that are not necessary or irrelevant to the knowing of the event and the increase in the knowledge associated with the experience.

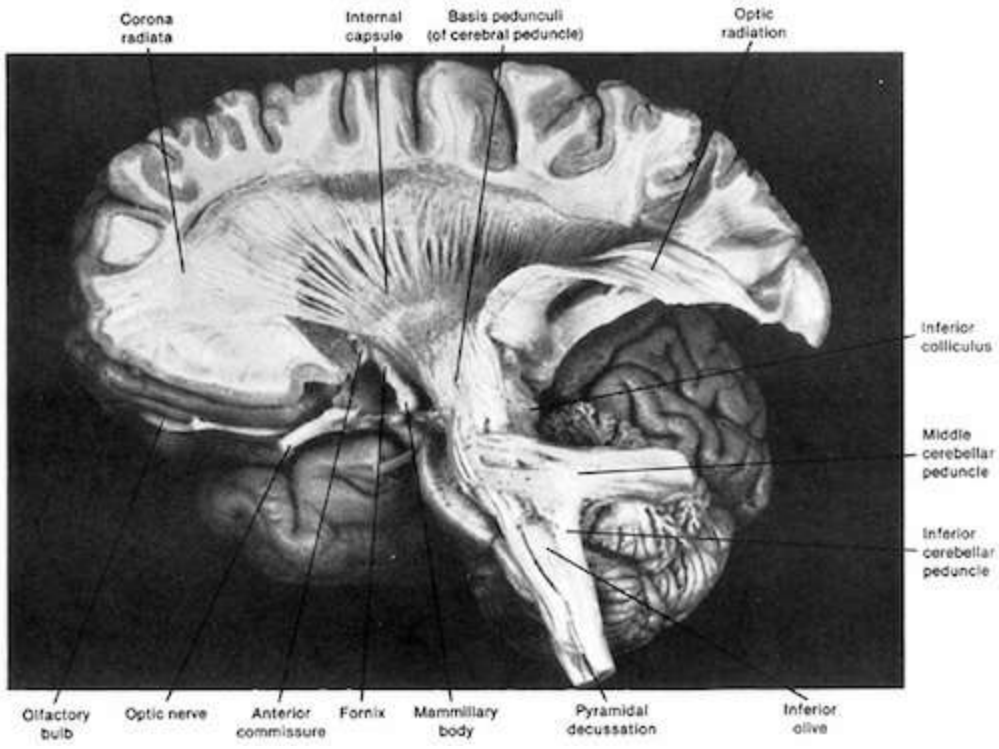
If considered from the perspective of an isolated aspect of the mind and the dominating stream of consciousness, Von Neuman's conceptions are essentially correct. However, neither the brain nor the mind function in isolation but in interaction with other neural tissues and mental/perceptual/sensory realms (Joseph 1982, 1992, 1999a). Perceptual functions are not "eliminated" and removed from the brain. Instead, they are prevented from interfering with the attentional processes of one aspect of the multiplicity of mind which dominates during the knowing event (Joseph, 1986b, 1999a).

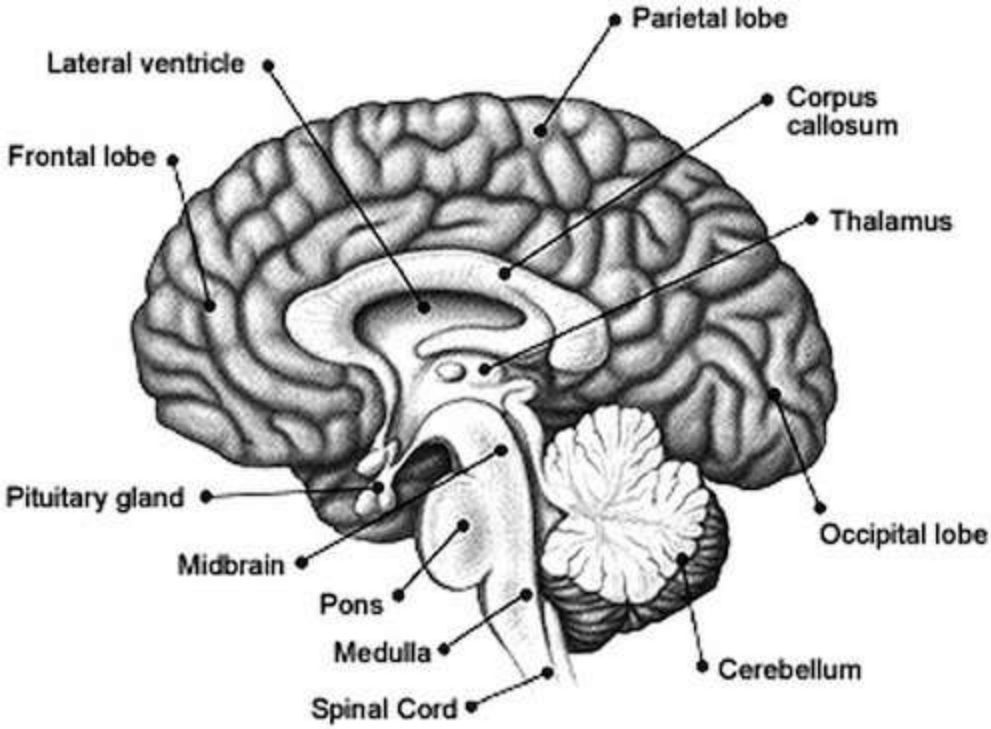
Consider, by way of example, you are sitting in your office reading this text. The pressure of the chair, the physical sensations of your shoes and clothes, the musculature of your body as it holds one then another position, the temperature of the room, various odors and fragrances, a multitude of sounds, visual sensations from outside your area of concentration and focus, and so on, are all being transmitted to the brainstem, midbrain, and olfactory limbic system. These signals are then relayed to various subnuclei within the thalamus.

The neural tissues of the brainstem, midbrain, limbic system and thalamus are associated with the "old brain." However, those aspects of consciousness we most closely associated with humans are associated with the "new brain" the neocortex (Joseph, 1982, 1992). Therefore, although you may be "aware" of these sensations while they are maintained within the old brain, you are

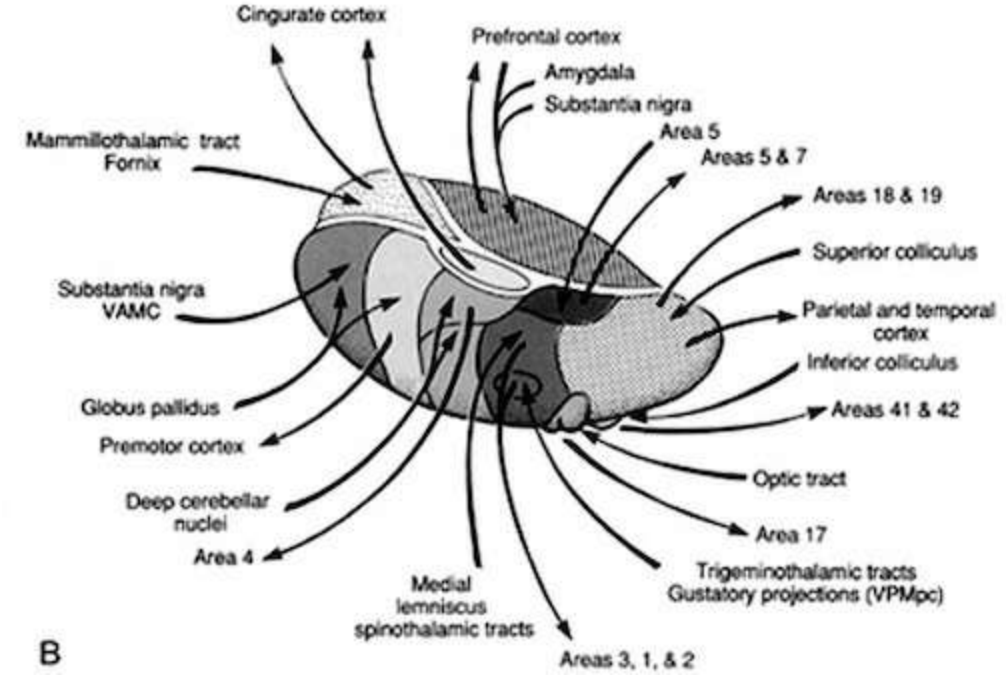
not “conscious” of them, unless a decision is made to become conscious or they increase sufficiently in intensity that they are transferred to the neocortex and forced into the focus of consciousness (Joseph, 1982, 1986b, 1992, 1999a).



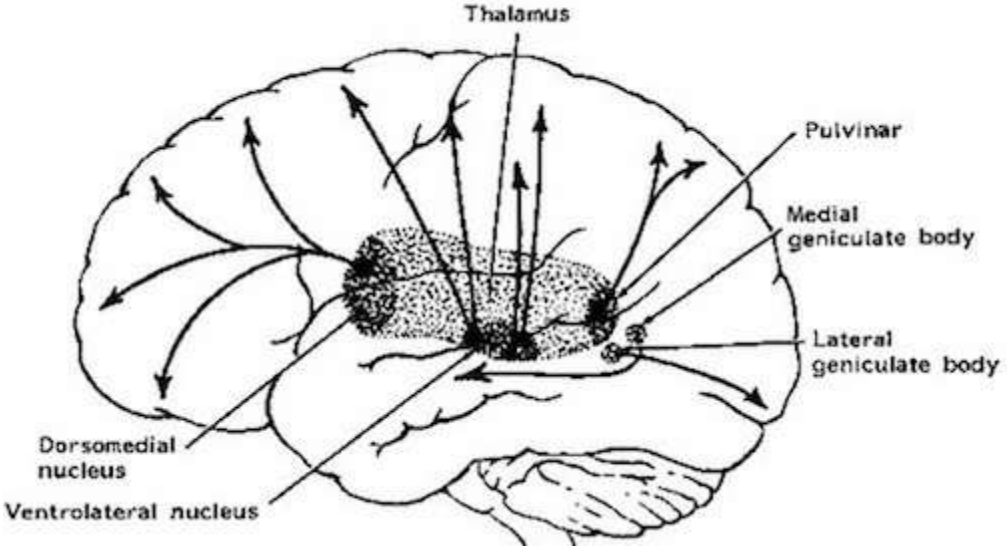

Corona radiata
Internal capsule
Basis pedunculi (of cerebral peduncle)
Optic radiation
Inferior colliculus
Middle cerebellar peduncle
Inferior cerebellar peduncle
Olfactory bulb
Optic nerve
Anterior commissure
Fornix
Mammillary body
Pyramidal decussation
Inferior olive

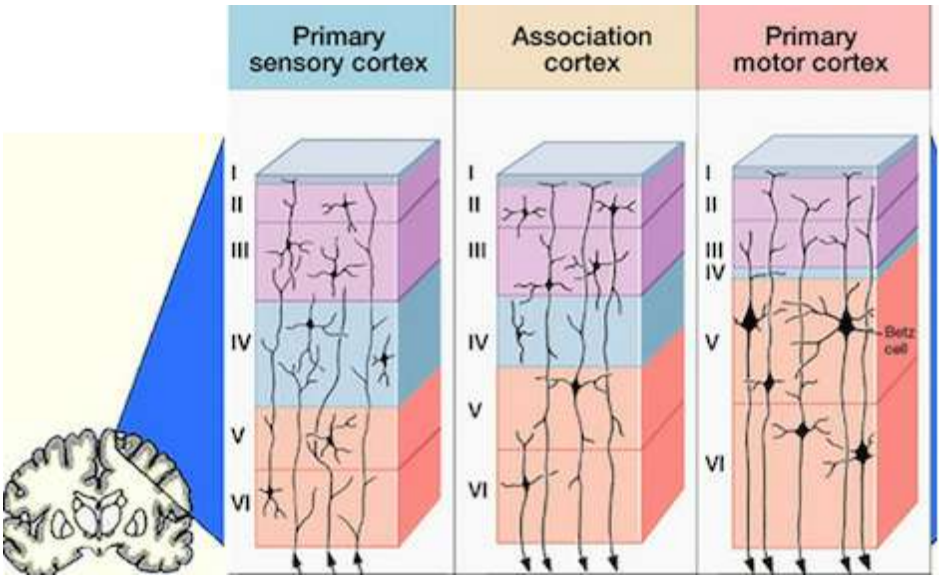


The different parts of the brain

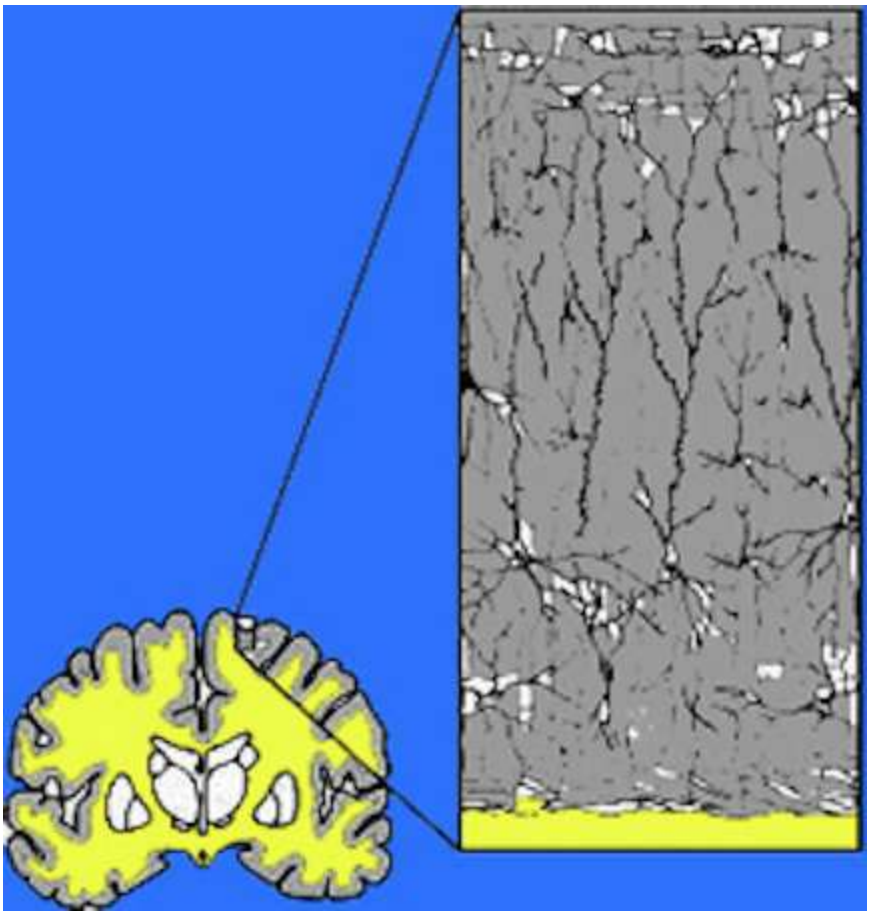

Cingurate cortex
Prefrontal cortex
Amygdala
Substantia nigra
Area 5
Areas 5 & 7
Areas 18 & 19
Superior colliculus
Parietal and temporal cortex
Inferior colliculus
Areas 41 & 42
Optic tract
Area 17
Trigeminothalamic tracts
Gustatory projections (VPMpc)
Areas 3, 1, & 2
Medial lemniscus spinothalamic tracts
Area 4
Deep cerebellar nuclei
Premotor cortex
Globus pallidus
Substantia nigra VAMC
Mammillothalamic tract
Fornix

B


Thalamus
Pulvinar
Medial geniculate body
Lateral geniculate body
Dorsomedial nucleus
Ventrolateral nucleus

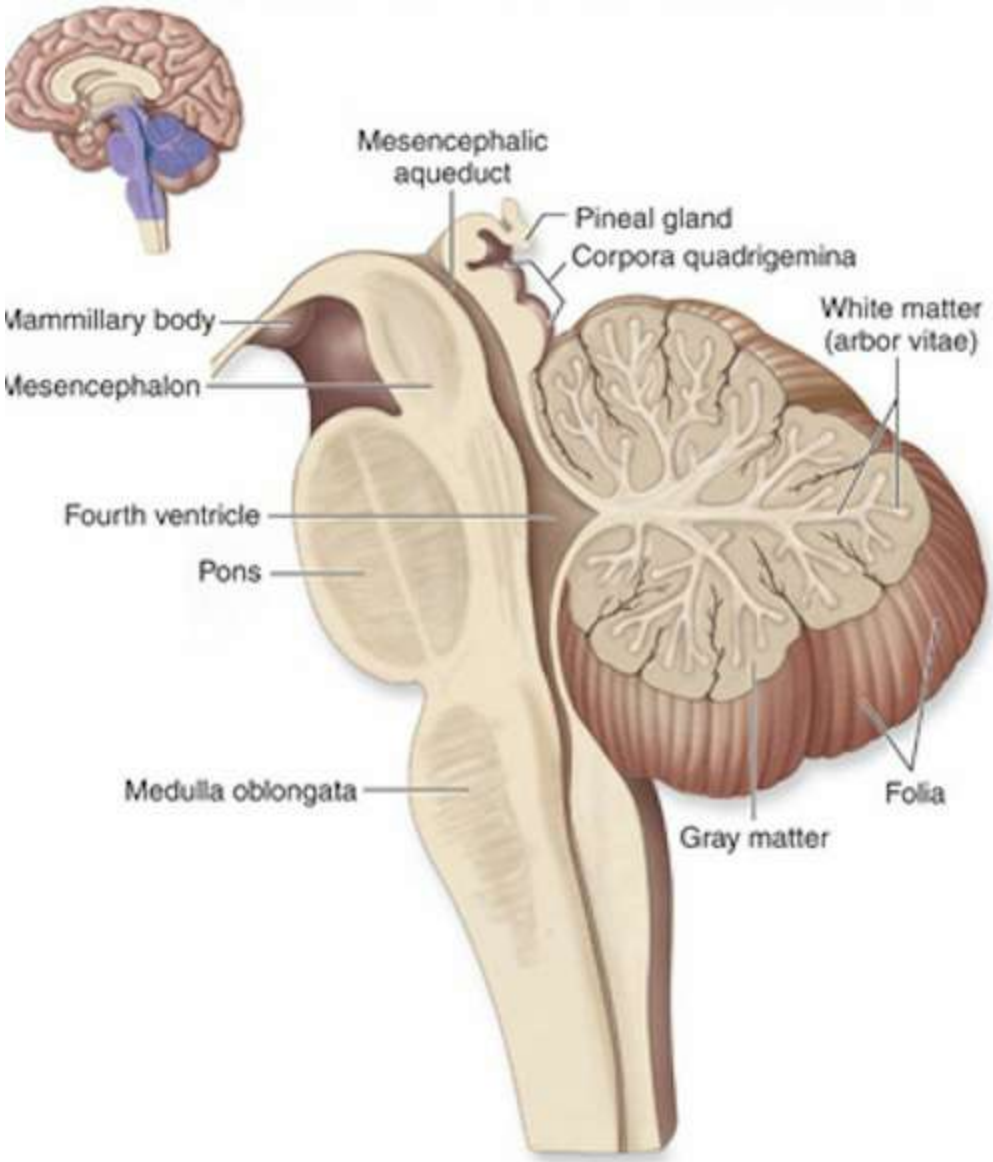


The old brain is covered by a gray mantle of new cortex, neocortex. The sensations alluded to are transferred from the old brain to the thalamus which relays these signals to the neocortex. Human consciousness and the "higher" level of the multiplicity of mind, are associated with the "new brain."

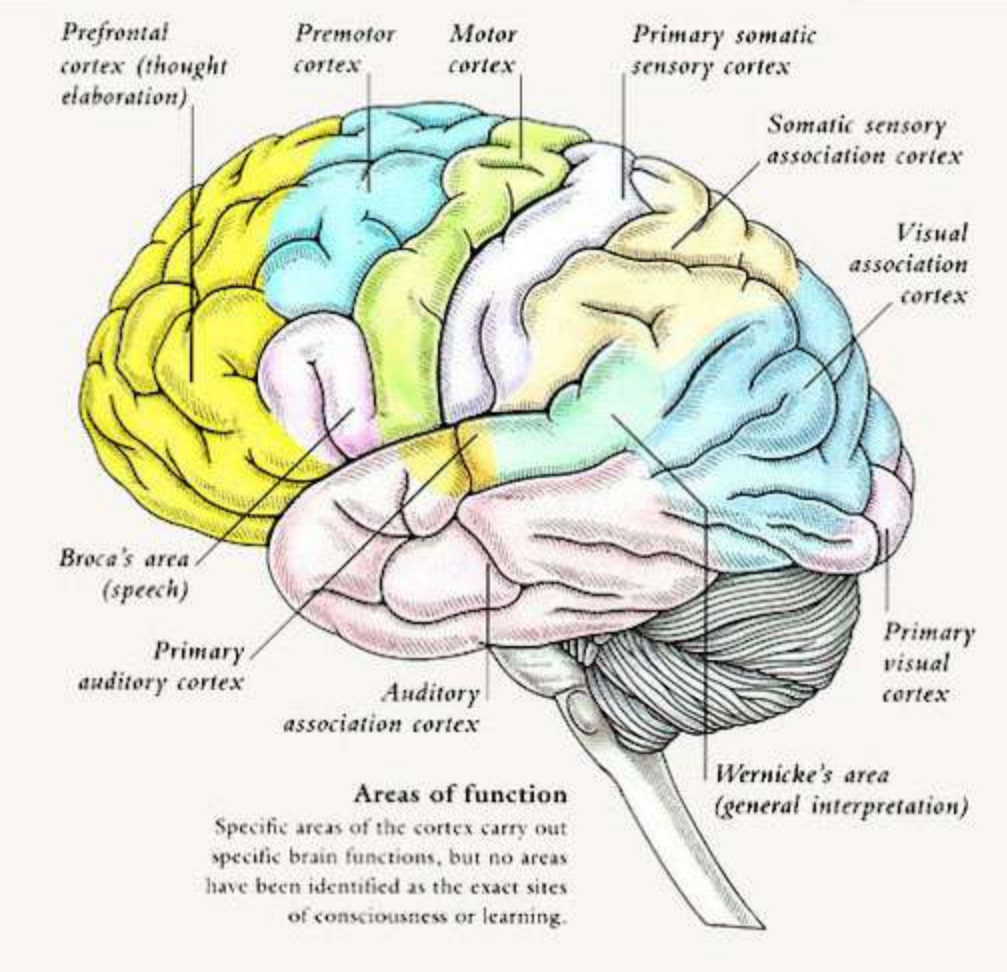


(Left) The Corona Radiata.

For example, visual input is transmitted from the eyes to the midbrain and thalamus and is transferred to the primary visual receiving area maintained in the neocortex of the occipital lobe (Casagrande & Joseph 1978, 1980; Joseph and Casagrande, 1978). Auditory input is transmitted from the inner ears to the brainstem, midbrain, and thalamus, and is transferred to the primary auditory receiving area within the neocortex of the temporal lobe. Tactual-physical stimuli are also transmitted from the thalamus to the primary somatosensory areas maintained in the neocortex of the parietal lobe. From the primary areas these signals are transferred to the adjoining “association” areas, and simple percepts become more complex by association (Joseph, 1996).



(a) Midsagittal section


Prefrontal cortex (thought elaboration)
Premotor cortex
Motor cortex
Primary somatic sensory cortex
Somatic sensory association cortex
Visual association cortex
Broca's area (speech)
Primary auditory cortex
Auditory association cortex
Primary visual cortex
Wernicke's area (general interpretation)
Areas of function
Specific areas of the cortex carry out specific brain functions, but no areas have been identified as the exact sites of consciousness or learning.

Monitoring all this perceptual and sensory activity within the thalamus and neocortex is the frontal lobes of the brain, also known as the senior executive of the brain and personality (Joseph 1986b, 1999a; Joseph et al., 1981). It is the frontal lobes which maintain the focus of attention and which can selectively inhibit any additional processing of signals received in the primary areas.

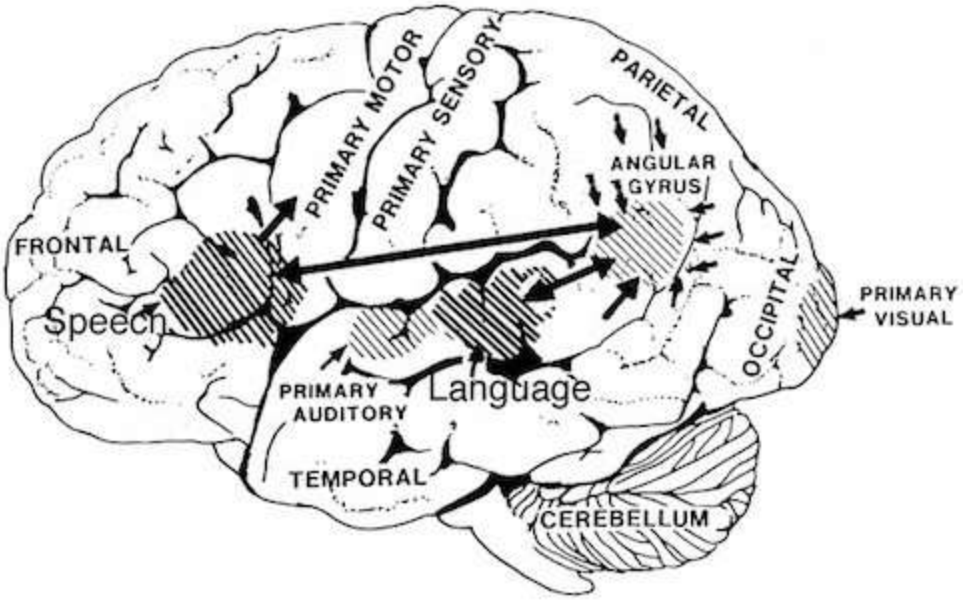
There are two frontal lobes, a right and left frontal lobe which communicate via a bridge of nerve fibers. Each frontal lobe, and subdivisions within each are concerned with different types of mental activity (Joseph, 1999a).

The left frontal lobe, among its many functions, makes possible the ability to speak. It is associated with the verbally expressive, speaking aspects of consciousness. However, there are different aspects of consciousness associated not only with the frontal lobe, but with each lobe of the brain and

its subdivisions (Joseph, 1986b; 1996, 12012).

4. Knowing Yet Not Knowing: Disconnected Consciousness

Consider the well known phenomenon of "word finding difficulty" also known as "tip of the tongue." You know the word you want (the "thingamajig") but at the same time, you can't gain access to it. That is, one aspect of consciousness knows the missing word, but another aspect of consciousness associated with talking and speech can't gain access to the word. The mind is disconnected from itself. One aspect of mind knows, the other aspect of mind does not.



This same phenomenon, but much more severe and disabling, can occur if the nerve fiber pathway linking the language areas of the left hemisphere are damaged. For example, Broca's area in the frontal lobe expresses humans speech. Wernicke's area in the temporal lobe comprehends speech. The inferior parietal lobe associates and assimilates associations so that, for example, we can say the word "dog" and come up with the names of dozens of different breeds and then describe them (Joseph, 1982; Joseph and Gallagher 1985; Joseph et al., 1984). Therefore, if Broca's area is disconnected from the posterior language areas, one aspect of consciousness may know what it wants to say, but the speaking aspect of consciousness will

be unable to gain access to it and will have nothing to say. This condition is called “conduction aphasia.”

Or consider damage which disconnects the parietal lobe from Broca’s area. If you place an object, e.g., a comb, out-of-sight, in the person’s right hand, and ask them to name the object, the speaking aspect of consciousness may know something is in the hand, but will be unable to name it. However, although they can’t name it, and can’t guess if shown pictures, if the patient is asked to point to the correct object, they will correctly pick out the comb (Joseph, 1996).

Therefore, part of the brain and mind may act purposefully (e.g. picking out the comb), whereas another aspect of the brain and mind is denied access to the information that the disconnected part of the mind is acting on.

Thus, the part of the brain and mind which is perceiving and knowing, is not the same as the part of the brain and mind which is speaking. This phenomenon occurs even in undamaged brains, when the multiplicity of minds which make up one of the dominant streams of consciousness, become disconnected and/or are unable to communicate.

5. The Visual Mind: Denial of Blindness

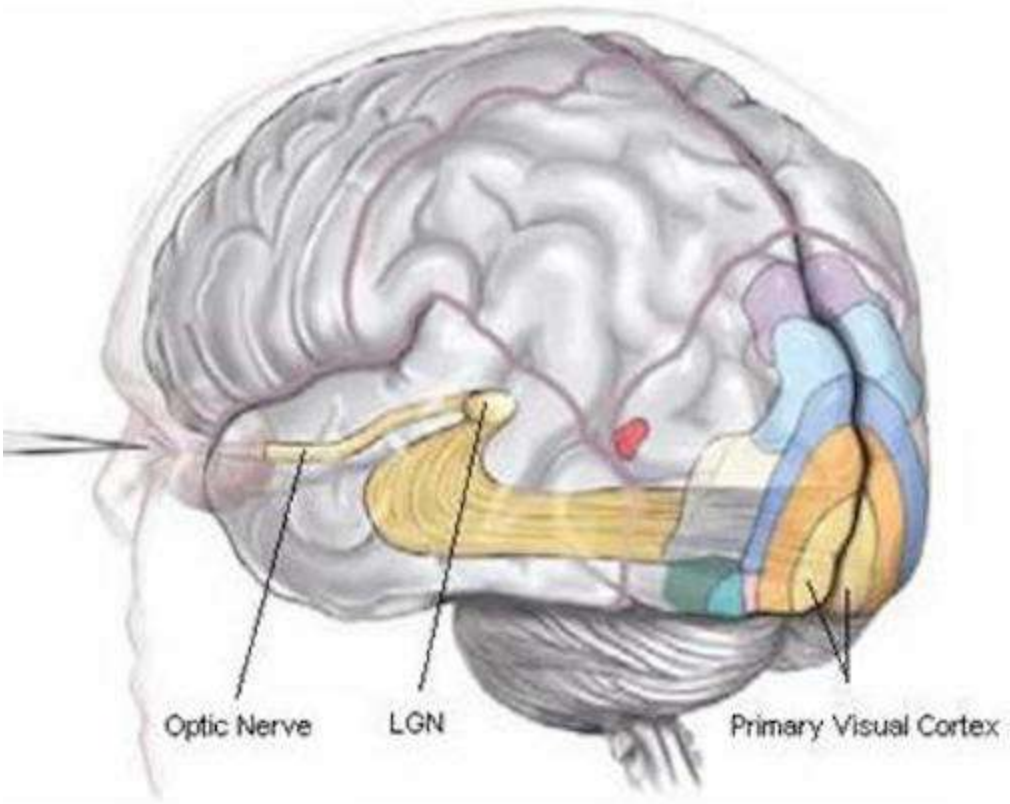
All visual sensations first travel from the eyes to the thalamus and midbrain. At this level, these visual impressions are outside of consciousness, though we may be aware of them. These visual sensations are then transferred to the primary visual receiving areas and to the adjacent association areas in the neocortex of the occipital lobe. Once these visual impressions reach the neocortex, consciousness of the visual word is achieved. Visual consciousness is made possible by the occipital lobe.

Destruction of the occipital lobe and its neocortical visual areas results in cortical blindness (Joseph, 1996, 2012). The consciousness mind is blinded and can not see or sense anything except vague sensations of lightness and darkness. However, because visual consciousness is normally maintained within the occipital lobe, with destruction of this tissue, the other mental systems will not know that they can’t see. The remaining mental system do not know they are blind.

Wernicke’s area in the left temporal lobe in association with the inferior parietal lobe comprehends and can generate complex language. Normally, visual input is transferred from the occipital to the inferior parietal lobe (IPL)

which is adjacent to Wernicke's area and the visual areas of the occipital lobe. Once these signals arrive in the IPL a person can name what they see; the visual input is matched with auditory-verbal signals and the conscious mind can label and talk about what is viewed (Joseph, 1982, 1986b; Joseph et al., 1984). Talking and verbally describing what is seen is made possible when this stream of information is transferred to Broca's area in the left frontal lobe (Joseph, 1982, 1999a). It is Broca's area which speaks and talks.

Therefore, with complete destruction of the occipital lobe, visual consciousness is abolished whereas the other mental system remain intact but are unable to receive information about the visual world. In consequence, the verbal aspects of consciousness and the verbal-language mind does not know it can't see because the brain area responsible for informing these mental system about seeing, no longer exists. . In fact the language-dependent conscious mind will deny that it is blind; and this is called: Denial of blindness.

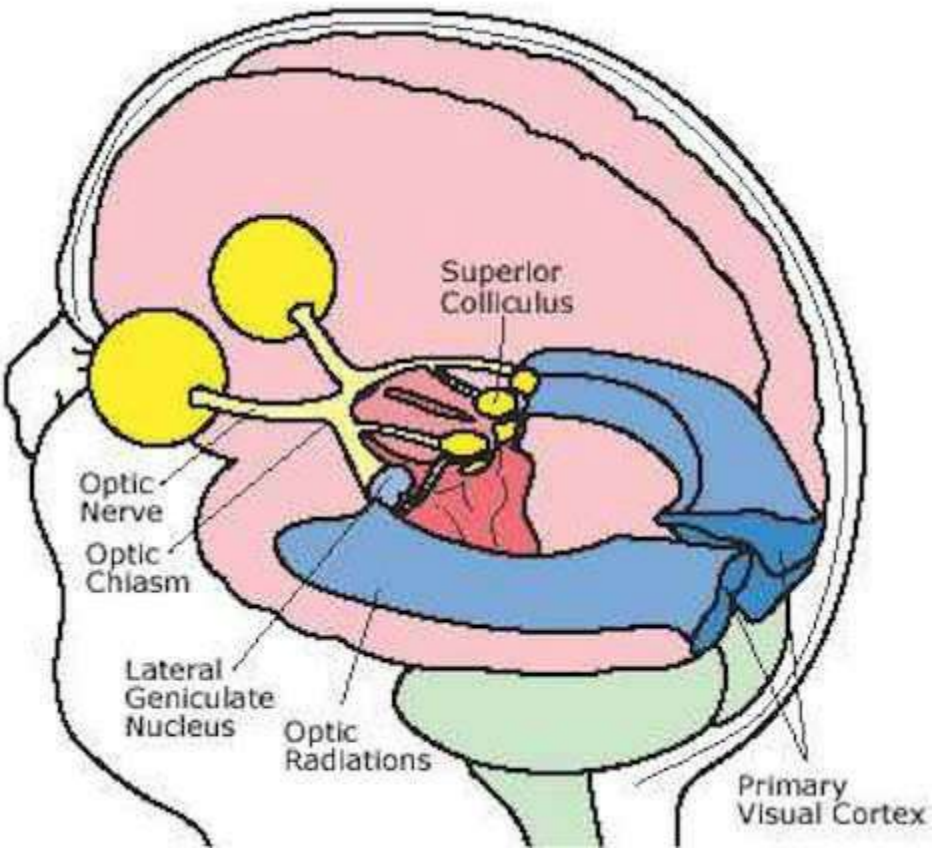


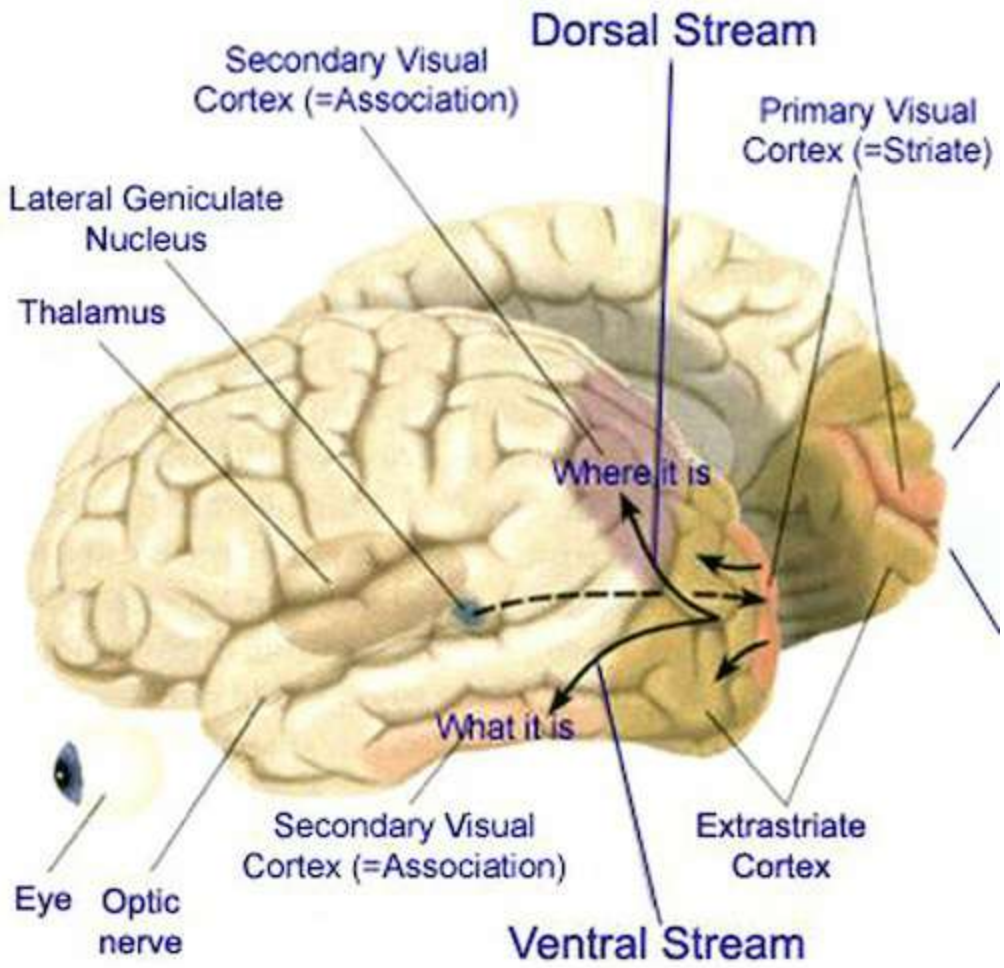
Normally, if it gets dark, or you close your eyes, the visual mind becomes conscious of this change in light perception and will alert the other mental realms. These other mental realms do not process visual signals and therefore they must be informed about what the visual mind is seeing. If the occipital lobe is destroyed, visual consciousness is destroyed, and the rest of the brain cannot be told that visual consciousness can't see. Therefore, the rest of the brain does not know it is blind, and when asked, will deny blindness and will make up reasons for why they bump into furniture or can't recognize objects held before their eyes (Joseph, 1986b, 1988a).

For example, when unable to name objects, they might confabulate an explanation: "I see better at home." Or, "I tripped because someone moved the furniture."

Even if you tell them they are blind, they will deny blindness; that is, the verbal aspects of consciousness will claim it can see, when it can't. The Language-dependent aspects of consciousness does not know that it is blind because information concerning blindness is not being received from the mental realms which support visual consciousness.

The same phenomenon occurs with small strokes destroying just part of the occipital lobe. Although a patient may lose a quarter or even half of their visual field, they may be unaware of it. This is because that aspect of visual consciousness no longer exists and can't inform the other mental realms of its condition.

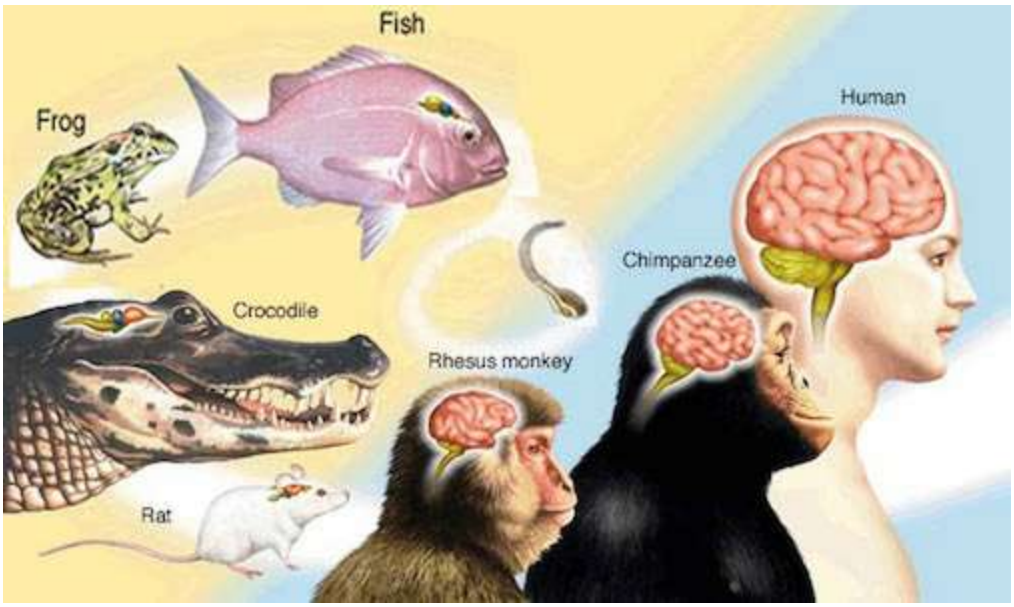

Superior
Colliculus
Optic
Nerve
Optic
Chiasm
Lateral
Geniculate
Nucleus
Optic
Radiations
Primary
Visual Cortex



6. "Blind Sight"

The brains of reptiles, amphibians, and fish do not have neocortex. Visual input is processed in the midbrain and thalamus and other old-brain areas as these creatures do not possess neocortex or lobes of the brain. In humans, this information is also received in the brainstem and thalamus and is then transferred to the newly evolved neocortex.

As is evident in non-mammalian species, these creatures can see, and they are aware of their environment. They possess an older-cortical (brainstem-thalamus) visual awareness which in humans is dominated by neocortical visual consciousness.


Fish
Frog
Human
Chimpanzee
Crocodile
Rhesus monkey
Rat

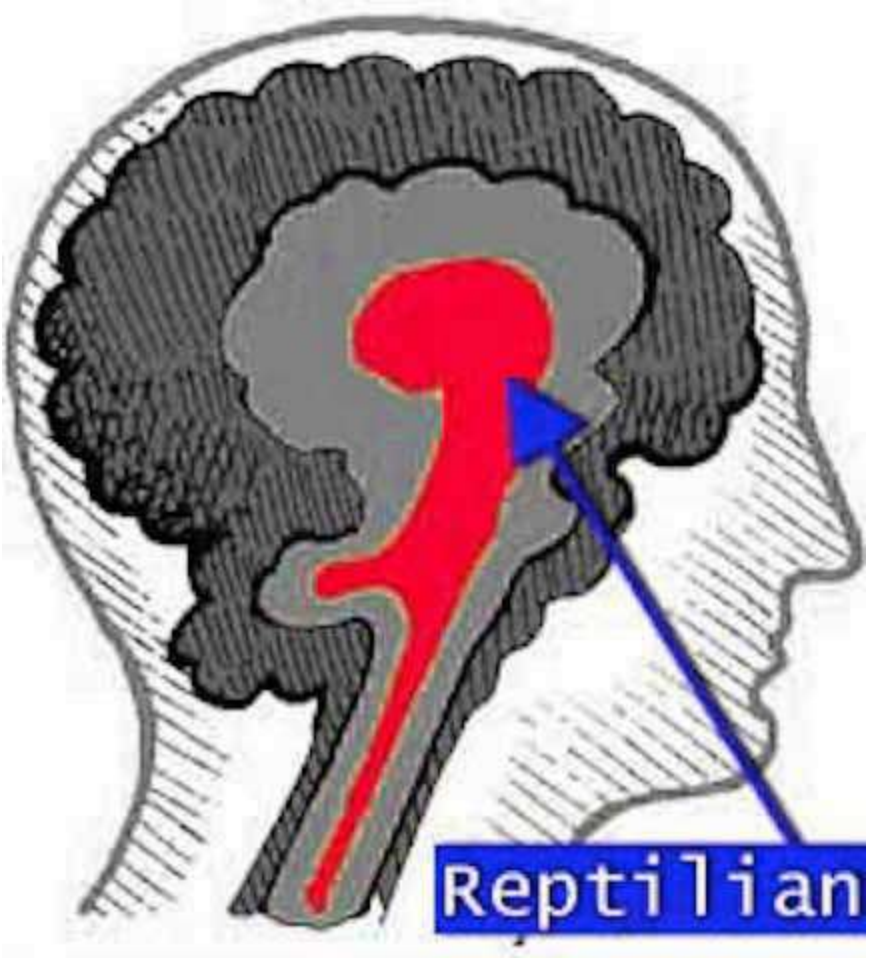


FIGURE: Human Reptile Brain

Therefore, even with complete destruction of the visual neocortex, and after the patient has had time to recover, some patients will demonstrate a non-conscious awareness of their visual environment. Although they are cortically blind and can't name objects and stumble over furniture and bump into walls, they may correctly indicate if an object is moving in front of their face, and they may turn their head or even reach out their arms to touch it--just as a frog can see a fly buzzing by and lap it up with its tongue. Although the patient can't name or see what has moved in front of his face, he may report that he has a "feeling" that something has moved.

Frogs do not have neocortex and they do not have language, and can't

describe what they see. However, humans and frogs have old cortex that process visual impressions and which can control and coordinate body movements. Therefore, although the neocortical realms of human consciousness are blind, the mental realms of the old brain can continue to see and can act on what it sees; and this is called: Blind sight (Joseph, 1996).

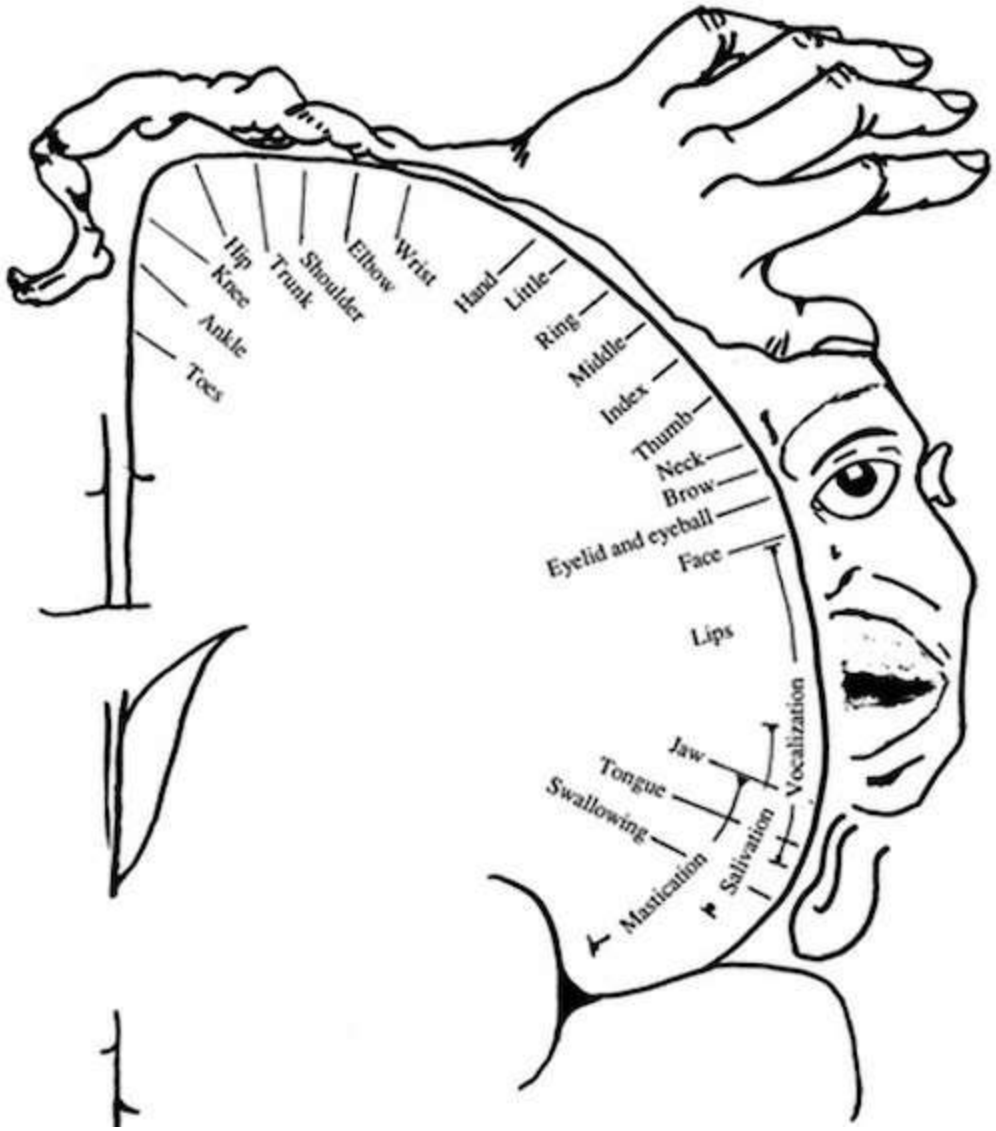
7. Body Consciousness: Denial of the Body, and Phantom Limbs

All tactile and physical-sensory impressions are relayed from the body to the brainstem and the thalamus, and are then transferred to the primary receiving and then the association area for somatosensory information located in the neocortex of the parietal lobe (Joseph, 1986b, 1996). The entire image of the body is represented in the parietal lobes (the right and left half of the body in the left and right parietal lobe respectively), albeit in correspondence with the sensory importance of each body part. Therefore, more neocortical space is devoted to the hands and fingers than to the elbow.

It is because the body image and body consciousness is maintained in the parietal area of the brain, that victims of traumatic amputation and who lose an arm or a leg, continue to feel as if their arm or their leg is still attached to the body. This is called: phantom limbs. They can see the leg is missing, but they feel as if it is still there; body-consciousness remains intact even though part of the body is missing (Joseph, 1986b, 1996). They may also continue to periodically experience the pain of the physical trauma which led to the amputation, and this is called "phantom limb pain."

Thus, via the mental system of the parietal lobe, consciousness of what is not there, may appear to consciousness as if it is still there. This is not a hallucination. The image of the body is preserved in the brain and so to is consciousness of the body; and this is yet another example of experienced reality being a manifestation of the brain and mind. In this regard, reality is literally mapped into the brain and is represented within the brain, such that even when aspects of this "reality" are destroyed and no longer exists external to the brain, it nevertheless continues to be perceived and experienced by the brain and the associated realms of body-consciousness.

Conversely, if the parietal lobe is destroyed, particularly the right parietal lobe (which maintains an image of the left half of the body), half of the body image may be erased from consciousness (Joseph, 1986b, 1988a). The remaining realms of mind will lose all consciousness of the left half of the body, which, in their minds, never existed.


Hip
Knee
Ankle
Toes
Trunk
Shoulder
Elbow
Wrist
Hand
Little
Ring
Middle
Index
Thumb
Neck
Brow
Eyelid and eyeball
Face
Lips
Jaw
Tongue
Swallowing
Mastication
Salivation
Vocalization

Doctor: “Give me your right hand!” (Patient offers right hand). “Now give me your left!” (The patient presents the right hand again. The right hand is held.) “Give me your left!” (The patient looks puzzled and does not move.) “Is there anything wrong with your left hand?”

Patient: “No, doctor.”

Doctor: “Why don’t you move it, then?”

Patient: “I don’t know.”

Doctor: “Is this your hand?” (The left hand is held before her eyes.)

Patient: “Not mine, doctor.”

Doctor: “Whose hand is it, then?”

Patient: “I suppose it’s yours, doctor.”

Doctor: “No, it’s not; I’ve already got two hands. look at it carefully.” (The left hand is again held before her eyes.)

Patient: “It is not mine, doctor.”

Doctor: “Yes it is, look at that ring; whose is it?” (Patient’s finger with marriage ring is held before her eyes)

Patient: “That’s my ring; you’ve got my ring, doctor. You’re wearing my ring!”

Doctor: “Look at it—it is your hand.”

Patient: “Oh, no doctor.”

Doctor: “Where is your left hand then?”

Patient: “Somewhere here, I think.” (Making groping movements near her left shoulder).

Because the body image has been destroyed, consciousness of that half of the body is also destroyed. The remaining mental systems and the language-dependent conscious mind will completely ignore and fail to recognize their left arm or leg because the mental system responsible for consciousness of the body image no longer exists. If the left arm or leg is shown to them, they will claim it belongs to someone else, such as the nurse or the doctor. They may dress or groom only the right half of their body, eat only off the right half of their plates, and even ignore painful stimuli applied to the left half of their bodies (Joseph, 1986b, 1988a).

However, if you show them their arm and leg (whose ownership they deny), they will admit these extremities exists, but will insist the leg or arm does not belong to them, even though the arm or the leg is wearing the same

clothes covering the rest of their body. Instead, the language dependent aspects of consciousness will confabulate and make up explanations and thus create their own reality. One patient said the arm belonged to a little girl, whose arm had slipped into the patient's sleeve. Another declared (speaking of his left arm and leg), "That's an old man. He stays in bed all the time."

One such patient engaged in peculiar erotic behavior with his left arm and leg which he believed belonged to a woman. Some patients may develop a dislike for their left arms, try to throw them away, become agitated when they are referred to, entertain persecutory delusions regarding them, and even complain of strange people sleeping in their beds due to their experience of bumping into their left limbs during the night (Joseph, 1986b, 1988a). One patient complained that the person sharing her bed, tried to push her out of the bed and then insisted that if it happened again she would sue the hospital. Another complained about "a hospital that makes people sleep together." A female patient expressed not only anger but concern least her husband should find out; she was convinced it was a man in her bed.

The right and left parietal lobes maintain a map and image of the left and right half of the body, respectively. Therefore, when the right parietal lobe is destroyed, the language-dependent mental systems of the left half of the brain, having access only to the body image for the right half of the body, is unable to become conscious of the left half of their body, except as body parts that they then deduce must belong to someone else.

However, when the language dominant mental system of the left hemisphere denies ownership of the left extremity these mental system are in fact telling the truth. That is, the left arm and leg belongs to the right not the left hemisphere; the mental system that is capable of becoming conscious of the left half of their body no longer exist.

When the language axis (Joseph, 1982, 2000), i.e. the inferior parietal lobe, Broca's and Wernicke's areas, are functionally isolated from a particular source of information, the language dependent aspect of mind begins to make up a response based on the information available. To be informed about the left leg or left arm, it must be able to communicate with the cortical area (i.e. the parietal lobe) which is responsible for perceiving and analyzing information regarding the extremities. When no message is received and when the language axis is not informed that no messages are being transmitted, the language zones instead relie on some other source even

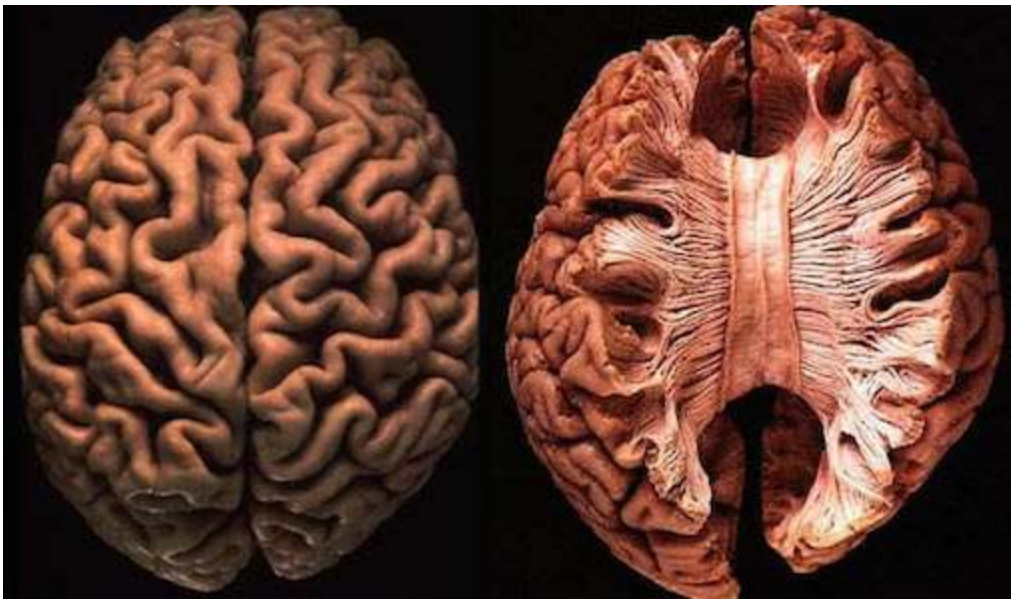
when that source provides erroneous input (Joseph, 1982, 1986b; Joseph et al., 1984); substitute material is assimilated and expressed and corrections cannot be made (due to loss of input from the relevant knowledge source). The patient begins to confabulate. This is because the patient who speaks to you is not the 'patient' who is perceiving- they are in fact, separate; multiple minds exist in the same head.

8. Split-Brains and Split-Minds.

The multiplicity of mind is not limited to visual consciousness, body consciousness, or the language-dependent consciousness. Rather the multiplicity of mind include social consciousness, emotional consciousness, and numerous other mental realms linked with specific areas of the brain such as the limbic system (emotion), frontal lobes (rational thought), the inferior temporal lobes (memory) and the two halves of the brain where multiple streams of mental activity become subordinated and dominated by two distinct realms of mind; consciousness and awareness (Joseph, 1982, 1986a,b, 1988a,b, 2012).

The brain is not a singularity. This is most apparent when viewing the right and left half of the brain which are divided by the interhemispheric fissure and almost completely split into two cerebral hemispheres. These two brain halves are connected by a rope of nerve fibers, the corpus callosum, which enables them to share and exchange some information, but not all information as these two mental realms maintain a conscious awareness of different realities.

For example, it is well established that the right cerebral hemisphere is dominant over the left in regard to the perception, expression and mediation of almost all aspects of social and emotional functioning and related aspects of social/emotional language and memory. Further, the right hemisphere is dominant for most aspects of visual-spatial perceptual functioning, the comprehension of body language, the recognition of faces including friend's loved ones, and one's own face in the mirror (Joseph, 1988a, 1996).

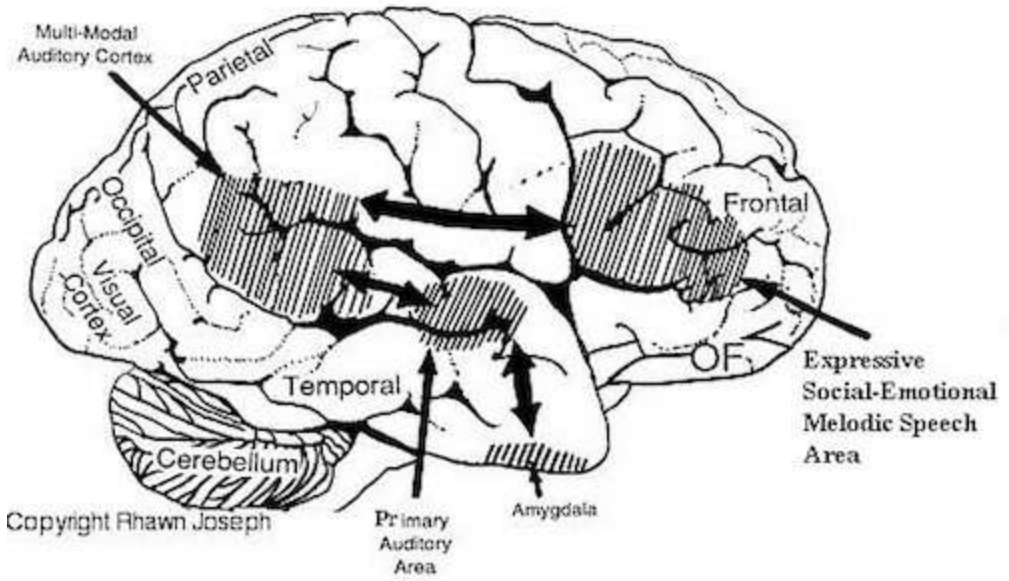


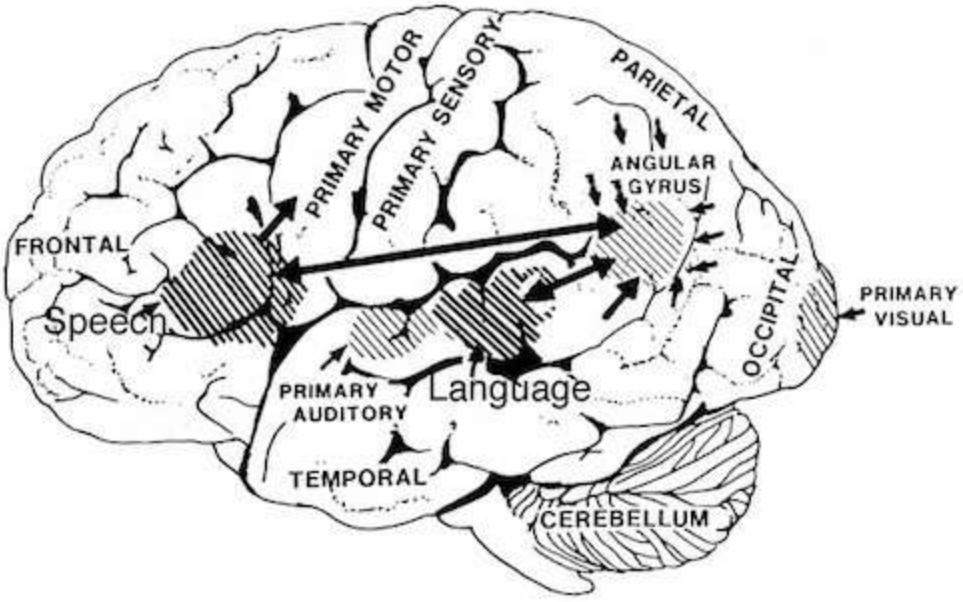
Recognition of one's own body and the maintenance of the personal body image is also the dominant realm of the right half of the brain (Joseph, 1986b, 1988a). The body image, for many, is tied to personal identity; and the same is true of the recognition of faces including one's own face.

The right is also dominant for perceiving and analyzing visual-spatial relationships, including the movement of the body in space (Joseph, 1982, 1988a). Therefore, one can throw or catch a ball with accuracy, dance across a stage, or leap across a babbling brook without breaking a leg.

The perception of environmental sounds (water, wind, a meowing cat) and the social, emotional, musical, and melodic aspects of language, including the ability to sing, curse, or pray, are also the domain of the right hemisphere mental system (Joseph, 1982, 1988a). Hence, it is the right hemisphere which imparts the sounds of sarcasm, pride, humor, love, and so on, into the stream of speech, and which conversely can determine if others are speaking with sincerity, irony, or evil intentions.

By contrast, expressive and receptive speech, linguistic knowledge and thought, mathematical and analytical reasoning, reading, writing, and arithmetic, as well as the temporal-sequential and rhythmical aspects of consciousness, are associated with the functional integrity of the left half of the brain in the majority of the population (Joseph, 1982, 1996). The language-dependent mind is linked to the left hemisphere.





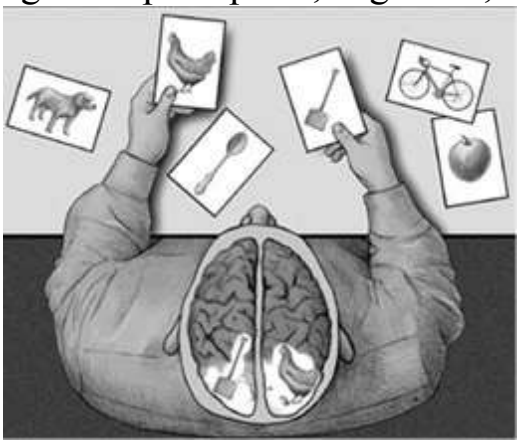
Certainly, there is considerable overlap in functional representation. Moreover, these two mental system interact and assist the other, just as the left and right hands cooperate and assist the other in performing various tasks. For example, if you were standing at the bar in a nightclub, and someone were to tap you on the shoulder and say, “Do you want to step outside,” it is the mental system of the left hemisphere which understands that a question about “outside” has been asked, but it is the mental system of

the right which determines the underlying meaning, and if you are being threatened with a punch in the nose, or if a private conversation is being sought.

However, not all information can be transferred from the right to the left, and vice versa (Gallagher and Joseph, 1982; Joseph, 1982, 1988a; Joseph and Gallagher, 1985; Joseph et al., 1984). Because each mental system is unique, each "speaks a different language" and they cannot always communicate. Not all mental events can be accurately translated, understood, or even recognized by the other half of the brain. These two major mental systems, which could be likened to "consciousness" vs "awareness" exist in parallel, simultaneously, and both can act independently of the other, have different goals and desires, and come to completely different conclusions. Each mental system has its own reality.

The existence of these two independent mental realms is best exemplified and demonstrated following "split-brain" surgery; i.e. the cutting of the corpus callosum fiber pathway which normally allows the two hemisphere's to communicate.

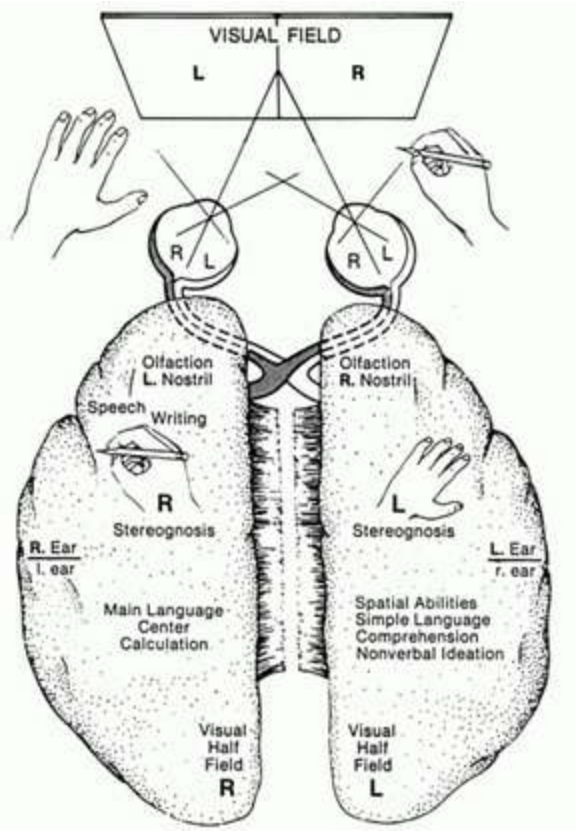
As described by Nobel Lauriate Roger Sperry (1966, p. 299), "Everything we have seen indicates that the surgery has left these people with two separate minds, that is, two separate spheres of consciousness. What is experienced in the right hemisphere seems to lie entirely outside the realm of awareness of the left hemisphere. This mental division has been demonstrated in regard to perception, cognition, volition, learning and memory."

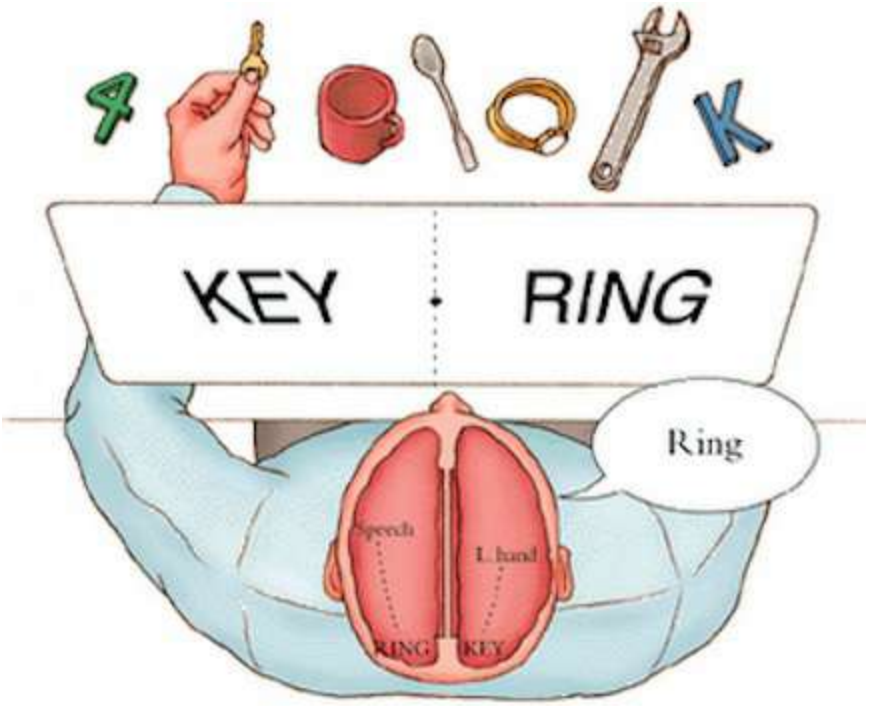


The right half of the brain controls and perceives the left half of the body and visual space, whereas the right half of the body and visual space is the domain of the left hemisphere. Therefore, following split-brain surgery, if a

comb, spoon, or some other hidden object is placed in the left hand (out of sight), the left hemisphere, and the language-dependent conscious mind, will not even know the left hand is holding something and will be unable to name it, describe it, or if given multiple choices point to the correct item with the right hand (Joseph 1988a,b; Sperry, 1966). However, the right hemisphere can raise the left hand and not only point to the correct object, but can pantomime its use.

If the split-brain patient is asked to stare at the center of a white screen and words like “Key Ring” are quickly presented, such that the word “Key” falls in the left visual field (and thus, is transmitted to the right cerebrum) and the word “Rings” falls in the right field (and goes to the left hemisphere), the language dependent conscious mind will not see the word “Key.” If asked, the language-dependent conscious mind will say “Ring” and will deny seeing the word “Key.” However, if asked to point with the left hand, the mental system of the right hemisphere will correctly point to the word “Key.”





Therefore, given events “A” and “B” one half of the brain may know A, but know nothing about B which is known only by the other half of the brain. In consequence, what is known vs what is not known becomes relatively imprecise depending on what aspects of reality are perceived and “known” by which mental system (Joseph 1986a; Joseph et al., 1984). There is no such thing as singularity of mind. Since the brain and mind is a multiplicity, “A” and “B” can be known simultaneously, even when one mind is knows nothing about the existence of A or B.

In that the brain of the normal as well as the “split-brain” patient maintains the neuroanatomy to support a multiplicity of mind, and the presence of two dominant psychic realms, it is therefore not surprising that “normal” humans often have difficulty “making up their minds,” suffer internal conflicts over love/hate relationships, and are plagued with indecision even when staring into an open refrigerator and trying to decide what to eat. “Making up one’s mind” can be an ordeal involving a multiplicity of minds.

However, this conflict becomes even more apparent following split-brain surgery and the cutting of the corpus callosum fiber pathway which links these two parallel streams of conscious-awareness.

Akelaitis (1945, p. 597) describes two patients with complete corpus callosotomies who experienced extreme difficulties making the two halves of their bodies cooperate. “In tasks requiring bimanual activity the left hand would frequently perform oppositely to what she desired to do with the right hand. For example, she would be putting on clothes with her right and pulling them off with her left, opening a door or drawer with her right hand and simultaneously pushing it shut with the left. These uncontrollable acts made her increasingly irritated and depressed.”

Another patient experienced difficulty while shopping, the right hand would place something in the cart and the left hand would put it right back again and grab a different item.

A recently divorced male patient complained that on several occasions while walking about town he found himself forced to go some distance in another direction by his left leg. Later (although his left hemisphere was not conscious of it at the time) it was discovered that this diverted course, if continued, would have led him to his former wife’s new home.

Geschwind (1981) reports a callosal patient who complained that his left hand on several occasions suddenly struck his wife--much to the embarrassment of his left (speaking) hemisphere. In another case, a patient’s left hand attempted to choke the patient himself and had to be wrestled away.

Bogen (1979, p. 333) indicates that almost all of his “complete commissurotomy patients manifested some degree of intermanual conflict.” One patient, Rocky, experienced situations in which his hands were uncooperative; the right would button up a shirt and the left would follow right behind and undo the buttons. For years, he complained of difficulty getting his left leg to go in the direction he (or rather his left hemisphere) desired. Another patient often referred to the left half of her body as “my little sister” when she was complaining of its peculiar and independent actions.

Another split-brain patient reported that once when she had overslept her left hand began slapping her face until she (i.e. her left hemisphere) woke up. This same patient, in fact, complained of several instances where her left hand had acted violently toward herself and other people (Joseph, 1988a).

Split brain patient, 2-C, complained of instances in which his left hand would perform socially inappropriate actions, such as striking his mother across the face (Joseph, 1988b). Apparently his left and right hemisphere also

liked different TV programs. He complained of numerous instances where he (his left hemisphere) was enjoying a program, when, to his astonishment, the left half of his body pulled him to the TV, and changed the channel.

The right and left hemisphere also liked different foods and had different attitudes about exercise. Once, after 2-C had retrieved something from the refrigerator with his right hand, his left took the food, put it back on the shelf and retrieved a completely different item "Even though that's not what I wanted to eat!" On at least one occasion, his left leg refused to continue "going for a walk" and would only allow him to return home.

In the laboratory, 2-C's left hemisphere often became quite angry with his left hand, and he struck it and expressed hate for it. Several times, his left and right hands were observed to engage in actual physical struggles, beating upon each other. For example, on one task both hands were stimulated simultaneously (while out of view) with either the same or two different textured materials (e.g., sandpaper to the right, velvet to the left), and he was required to point (with the left and right hands simultaneously) to an array of fabrics that were hanging in view on the left and right of the testing apparatus. However, at no time was he informed that two different fabrics were being applied.

After stimulation he would pull his hands out from inside the apparatus and point with the left to the fabric felt by the left and with the right to the fabric felt by the right.

Surprisingly, although his left hand (right hemisphere) responded correctly, his left hemisphere vocalized: "Thats wrong!" Repeatedly he reached over with his right hand and tried to force his left extremity to point to the fabric experienced by the right (although the left hand responded correctly! His left hemisphere didn't know this, however). His left hand refused to be moved and physically resisted being forced to point at anything different. In one instance a physical struggle ensued, the right grappling with the left with the two halves of the body hitting and scratching at each other!

Moreover, while 2-C was performing this (and other tasks), his left hemisphere made statements such as: "I hate this hand" or "This is so frustrating" and would strike his left hand with his right or punch his left arm. In these instances there could be little doubt that his right hemisphere mental system was behaving with purposeful intent and understanding, whereas his left hemisphere mental system had absolutely no comprehension of why his

left hand (right hemisphere) was behaving in this manner (Joseph, 1988b).

These conflicts are not limited to behavior, TV programs, choice of clothing, or food, but to actual feelings, including love and romance. For example, the right and left hemisphere of a male split-brain patient had completely different feelings about an ex-girlfriend. When he was asked if he wanted to see her again, he said "Yes." But at the same time, his left hand turned thumbs down!

Another split-brain patient suffered conflicts about his desire to smoke. Although is left hemisphere mental system enjoyed cigarettes, his left hand would not allow him to smoke, and would pluck lit cigarettes from his mouth or right hand and put them out. He had been trying to quit for years.

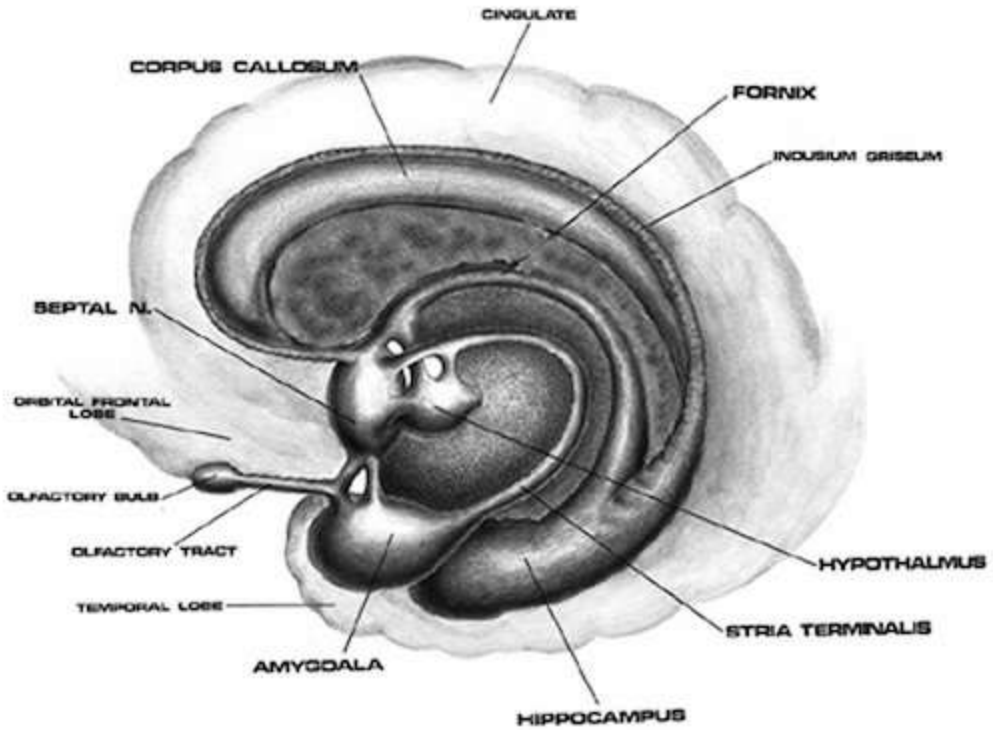
Because each head contains multiple minds, similar conflicts also plague those who have not undergone split-brain surgery. Each half of the brain and thus each mental system may have different attitudes, goals and interests. As noted above, 2-C experienced conflicts when attempting to eat, watch TV, or go for walks, his right and left hemisphere mental systems apparently enjoying different TV programs or types of food (Joseph 1988b). Conflicts of a similar nature plague us all. Split-brain patients are not the first to choke on self-hate or to harm or hate those they profess to love.

Each half of the brain is concerned with different types of information, and may react, interpret and process the same external experience differently and even reach different conclusions (Joseph 1988a,b; Sperry, 1966). Moreover, even when the goals are the same, the two halves of the brain may produce and attempt to act on different strategies.

Each mental system has its own reality. Singularity of mind, is an illusion.

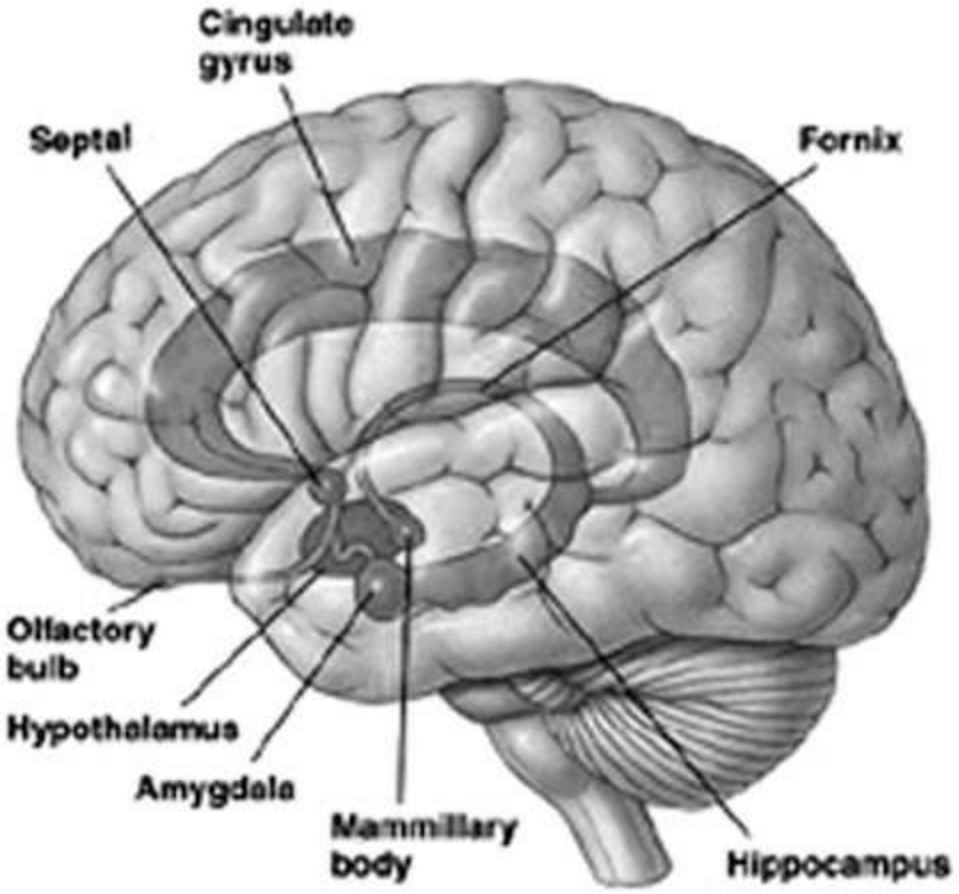
9. Dissociation and Self-Consciousness

The multiplicity of mind is not limited to the neocortex but includes old cortical structures, such as the limbic system (Joseph 1992). Moreover, limbic nuclei such as the amygdala and hippocampus interact with neocortical tissues creating yet additional mental systems, such as those which rely on memory and which contribute to self-reflection, personal identity, and even self-consciousness (Joseph, 1992, 1998, 1999b, 2001).



For example, both the amygdala and the hippocampus are implicated in the storage of long term memories, and both nuclei enable individuals to visualize and remember themselves engaged in various acts, as if viewing their behavior and actions from afar. Thus, you might see yourself and remember yourself engage in some activity, from a perspective outside yourself, as if you are an external witness; and this is a common feature of self-reflection and self-memory and is made possible by the hippocampus and overlying temporal lobe (Joseph, 1996, 2011).

The hippocampus in fact contains “place neurons” which cognitive map one’s position and the location of various objects within the environment (Nadel, 1991; O’Keefe, 1976; Wilson & McNaughton, 1993). Further, if the subject moves about in that environment, entire populations of these place cells will fire. Moreover, some cells are responsive to the movements of other people in that environment and will fire as that person is observed to move around to different locations or corners of the room (Nadel, 1991; O’Keefe, 1976; Wilson and McNaughton, 1993).



Electrode stimulation, or other forms of heightened activity within the hippocampus and overlying temporal lobe can also cause a person to see themselves, in real time, as if their conscious mind is floating on the ceiling staring down at their body (Joseph, 1998, 1999b, 2001). During the course of electrode stimulation and seizure activity originating in the temporal lobe or hippocampus, patients may report that they have left their bodies and are hovering upon the ceiling staring down at themselves (Daly, 1958; Penfield, 1952; Penfield & Perot 1963; Williams, 1956). That is, their consciousness and sense of personal identity appears to split off from their body, such that they experience themselves as as a consciousness that is conscious of itself as a conscious that is detached from the body which is being observed.

One female patient claimed that she not only would float above her body, but would sometimes drift outside and even enter into the homes of her neighbors. Penfield and Perot (1963) describe several patients who during a temporal lobe seizure, or neurosurgical temporal lobe stimulation, claimed

they split-off from their body and could see themselves down below. One woman stated: “it was though I were two persons, one watching, and the other having this happen to me.” According to Penfield (1952), “it was as though the patient were attending a familiar play and was both the actor and audience.”

Under conditions of extreme trauma, stress and fear, the amygdala, hippocampus and temporal lobe become exceedingly active (Joseph, 1998, 1999b). Under these conditions many will experience a “splitting of consciousness” and have the sensation they have left their body and are hovering beside or above themselves, or even that they floated away (Courtois, 2009; Grinker & Spiegel, 1945; Noyes & Kletti, 1977; van der Kolk 1987). That is, out-of-body dissociative experiences appear to be due to fear induced hippocampus (and amygdala) hyperactivation.

Likewise, during episodes of severe traumatic stress personal consciousness may be fragmented and patients may dissociate and experience themselves as splitting off and floating away from their body, passively observing all that is occurring (Courtois, 1995; Grinker & Spiegel, 1945; Joseph, 1999d; Noyes & Kletti, 1977; Southard, 1919; Summit, 1983; van der Kolk 1987).

Noyes and Kletti (1977) described several individuals who experienced terror, believed they were about to die, and then suffered an out-of body dissociative experience: “I had a clear image of myself... as though watching it on a television screen.” “The next thing I knew I wasn’t in the truck anymore; I was looking down from 50 to 100 feet in the air.” “I had a sensation of floating. It was almost like stepping out of reality. I seemed to step out of this world.”

One individual, after losing control of his Mustang convertible while during over 100 miles per hour on a rain soaked freeway, reported that “time seemed to slow down and then... part of my mind was a few feet outside the car zooming above it and then beside it and behind it and in front of it, looking at and analyzing the respective positions of my spinning Mustang and the cars surrounding me. Simultaneously I was inside trying to steer and control it in accordance with the multiple perspectives I was given by that part of my mind that was outside. It was like my mind split and one consciousness was inside the car, while the other was zooming all around outside and giving me visual feedback that enabled me to avoid hitting

anyone or destroying my Mustang."

Numerous individuals from adults to children, from those born blind and deaf, have also reported experiencing a dissociative consciousness after profound injury causing near death (Eadie 1992; Rawling 1978; Ring 1980). Consider for example, the case of Army Specialist J. C. Bayne of the 196th Light Infantry Brigade. Bayne was "killed" in Chu Lai, Vietnam, in 1966, after being simultaneously machine gunned and struck by a mortar. According to Bayne, when he opened his eyes he was floating in the air, looking down on his burnt and bloody body: "I could see me... it was like looking at a manikin laying there... I was burnt up and there was blood all over the place... I could see the Vietcong. I could see the guy pull my boots off. I could see the rest of them picking up various things... I was like a spectator... It was about four or five in the afternoon when our own troops came. I could hear and see them approaching... I looked dead... they put me in a bag... transferred me to a truck and then to the morgue. And from that point, it was the embalming process. I was on that table and a guy was telling jokes about those USO girls... all I had on was bloody undershorts... he placed my leg out and made a slight incision and stopped... he checked my pulse and heartbeat again and I could see that too... It was about that point I just lost track of what was taking place.... [until much later] when the chaplain was in there saying everything was going to be all right.... I was no longer outside. I was part of it at this point" (reported in Wilson, 1987, pp 113-114; and Sabom, 1982, pp 81-82).

Therefore, be it secondary to the fear of dying, or depth electrode stimulation, these experiences all appear to be due to a mental system which enables a the conscious mind to detach completely from the body in order to make the body an object of consciousness (Joseph, 1998, 1999b, 2001).

10. Quantum Consciousness

It could be said that consciousness is consciousness of something other than consciousness. Consciousness and knowledge of an object, such as a chair, are also distinct. Consciousness is not the chair. The chair is not consciousness. The chair is an object of consciousness, and thus become discontinuous from the quantum state.

Consciousness is consciousness of something and is conscious of not being that object that is is conscious of. By knowing what it isn't, consciousness may know what it is not, which helps define what it is. This

consciousness of not being the object can be considered the "collapse function" which results in discontinuity within the continuuum.

Further, it could be said that consciousness of consciousness, that is, self-consciousness, also imparts a duality, a separation, into the fabric of the quantum continuum. Therefore this consciousness that is the object of consciousness, becomes an abstraction, and may create a collapse function in the continuum .

However, in instances of dissociation, this consciousness is conscious of itself as a consciousness that is floating above its body; a body which contains the brain. The dissociative consciousness is not dissociated from itself as a consciousness, but only from its body. That is, there is an awareness of itself as a consciousness that is floating above the body, and this awareness is simultaneously one with that consciousness, as there is no separation, no abstractions, and no objectification. It is a singularity that is without form, without dimension, without shape.

Moreover, because this dissociated consciousness appears to be continuous with itself, there is no "collapse function" except in regard to the body which is viewed as an object of perception.

Therefore, in these instances we can not say that consciousness has split into a duality of observer and observed or knower and known, except in regard to the body. Dissociated consciousness is conscious of itself as consciousness; it is self-aware without separation and without reflecting. It is knowing and known, simultaneously.

In fact, many patients report that in the dissociated state they achieve or nearly achieved a state of pure knowing (Joseph, 1996, 2001).

A patient described by Williams (1956) claimed she was lifted up out of her body, and experienced a very pleasant sensation of elation and the feeling that she was "just about to find out knowledge no one else shares, something to do with the link between life and death." Another patient reported that upon leaving her body she not only saw herself down below, but was taken to a special place "of vast proportions, and I felt as if I was in another world" (Williams, 1956).

Other patients suffering from temporal lobe seizures or upon direct electrical activation have noted that things suddenly became "crystal clear" or that they had a feeling of clairvoyance, of having the ultimate truth revealed to them, of having achieved a sense of greater awareness and cosmic clarity

such that sounds, smells and visual objects seemed to have a greater meaning and sensibility, and that they were achieving a cosmic awareness of the hidden knowledge of all things (Joseph, 1996, 2001).

Although consciousness and the object of consciousness, that which is known, are not traditionally thought of as being one and the same, in dissociative states, consciousness and knowing, may become one and the same. The suggestion is of some type of cosmic unity, particularly as these patients also often report a progressive loss of the sense of individuality, as if they are merging into something greater than themselves, including a becoming one with all the knowledge of the universe; a singularity with god.

Commonly those who experience traumatic dissociative conscious states, not only float above the body, but report that they gradually felt they were losing all sense of individuality as they became embraced by a brilliant magnificent whiteness that extended out in all directions into eternity.

Therefore, rather than the dissociated consciousness acting outside the quantum state, it appears this mental state may represent an increasing submersion back into the continuity that is the quantum state, disappearing back into the continuum of singularity and oneness that is the quantum universe.

Dissociated consciousness may be but the last preamble before achieving the unity that is quantum consciousness, the unity of all things.

11. Conclusion: Quantum Consciousness and the Multiplicity of Mind

What is “Objective Reality” when the mind is a multiplicity which is capable of splitting up, observing itself, becoming blind to itself, and becoming blind to the features of the world which then cease to exist for the remaining mental realms?

Each mental system has its own “reality.” Each observer is a multiplicity that engages in numerous simultaneous acts of observation. Therefore, non-local properties which do not have an objective existence independent of the “act of observation” by one mental system, may achieve existence when observed by another mental system. The “known” and the “unknown” can exist simultaneously and interchangeably and this may explain why we don’t experience any macroscopic non-local quantum weirdness in our daily lives.

This means that quantum laws may apply to everything, from atoms to monkeys and woman and man and the multiplicity of mind. However, because of this multiplicity, this could lead to seemingly contradictory

predictions and uncertainty when measuring macroscopically objective systems which are superimposed on microscopic quantum systems. Indeed, this same principle applies to the multiplicity of mind, where dominant parallel streams of conscious awareness may be superimposed on other mental systems, and which may be beset by uncertainty.

Because of the multiplicity of mind, as exemplified by dissociative states, the observer can also be observed, and thus, the observer is not really external to the quantum state as is required by the standard collapse formulation of quantum mechanics. This raises the possibility that the collapse formulation can be used to describe the universe as a whole which includes observers observing themselves being observed.

The multiplicity of mind also explains why an object being measured by one mental system therefore becomes bundled up into a state where it either determinately has or determinately does not have the property being measured. Measurements performed by one mental system are not being performed by others, such that the same object can have an initial state and a post-measurement state and a final state simultaneously as represented in multiple minds in parallel, or separate states as represented by each mental realm individually.

The collapse dynamics of observation supposedly guarantees that a system will either determinately have or determinately not have a particular property. However, because the observer is observing with multiple mental systems the object can both have and not have specific properties when it is being measure and not measured, simply because it is being measured and not measured, or rather, observed and not observed or its different features observed simultaneously by multiple mental systems. Therefore, it can be continuous and discontinuous in parallel, and different properties can be known and not known in parallel simultaneously.

And the same rules apply to the mental systems which exist in multiplicity within the head of a single observer. Mental systems can become continuous or discontinuous, and can be known and not known simultaneously, in parallel. Thus, the standard collapse formulation can be used to describe systems that contain observers, as the mind/observer can be simultaneously internal and external to the described system.

The mind is a multiplicity and there is no such thing as a “single observer state.” Therefore, each element may be observed by multiple observer states

which perceive multiple object systems thereby giving the illusion that the object has been transformed during the collapse function. What this also implies is that contrary to the standard or Copenhagen interpretations, states may have both definite position and definite momentum at the same time.

Each mental system perceives a different physical world giving rise to multiple worlds and multiple realities which may be subordinated by one or another more dominant stream of conscious awareness.

Moreover, as the multiplicity of mind can also detach and become discontinuous with the body, whereas dissociative consciousness is continuous with itself, this indicates that the mind is also capable of becoming one with the continuum, and can achieve singularity so that universe and mind become one.

References

Akelaitis, A. J. (1945). Studies on the corpus callosum. American Journal of Psychiatry, 101, 594-599.

Bogen, J. (1979). The other side of the brain. Bulletin of the Los Angeles Neurological Society. 34, 135-162.

Bohr, N. (1934/1987), Atomic Theory and the Description of Nature, reprinted as The Philosophical Writings of Niels Bohr, Vol. I, Woodbridge: Ox Bow Press.

Bohr, N. (1958/1987), Essays 1932-1957 on Atomic Physics and Human Knowledge, reprinted as The Philosophical Writings of Niels Bohr, Vol. II, Woodbridge: Ox Bow Press.

Bohr, N. (1963/1987), Essays 1958-1962 on Atomic Physics and Human Knowledge, reprinted as The Philosophical Writings of Niels Bohr, Vol. III, Woodbridge: Ox Bow Press.

Casagrande, V. A. & Joseph, R. (1978). Effects of monocular deprivation on geniculostriate connections in prosimian primates. Anatomical Record, 190, 359.

Casagrande, V. A. & Joseph, R. (1980). Morphological effects of monocular deprivation and recovery on the dorsal lateral geniculate nucleus in prosimian primates. Journal of Comparative Neurology, 194, 413-426.

Courtois, C. A. (2009). Treating Complex Traumatic Stress Disorders: An Evidence-Based Guide Daly, D. (1958). Ictal affect. American Journal of

Psychiatry, 115, 97-108.

DeWitt, B. S., (1971). The Many-Universes Interpretation of Quantum Mechanics, in B. D.'Espagnat (ed.), Foundations of Quantum Mechanics, New York: Academic Press. pp. 167–218.

DeWitt, B. S. and Graham, N., editors (1973). The Many-Worlds Interpretation of Quantum Mechanics. Princeton University Press, Princeton, New-Jersey.

Eadie, B. J. (1993) Embraced by the light. New York, Bantam

Einstein, A. (1905a). Does the Inertia of a Body Depend upon its Energy Content? Annalen der Physik 18, 639-641.

Einstein, A. (1905b). Concerning an Heuristic Point of View Toward the Emission and Transformation of Light. Annalen der Physik 17, 132-148.

Einstein, A. (1905c). On the Electrodynamics of Moving Bodies. Annalen der Physik 17, 891-921.

Einstein, A. (1926). Letter to Max Born. The Born-Einstein Letters (translated by Irene Born) Walker and Company, New York.

Gallagher, R. E., & Joseph, R. (1982). Non-linguistic knowledge, hemispheric laterality, and the conservation of inequivalance. Journal of General Psychology, 107, 31-40.

Geschwind. N. (1981). The perverseness of the right hemisphere. Behavioral Brain Research, 4, 106-107.

Grinker, R. R., & Spiegel, J. P. (1945). Men Under Stress. McGraw-Hill.

Heisenberg. W. (1930), Physikalische Prinzipien der Quantentheorie (Leipzig: Hirzel). English translation The Physical Principles of Quantum Theory, University of Chicago Press.

Heisenberg, W. (1955). The Development of the Interpretation of the Quantum Theory, in W. Pauli (ed), Niels Bohr and the Development of Physics, 35, London: Pergamon pp. 12-29.

Heisenberg, W. (1958), Physics and Philosophy: The Revolution in Modern Science, London: Goerge Allen & Unwin.

Joseph, R. (1982). The Neuropsychology of Development. Hemispheric Laterality, Limbic Language, the Origin of Thought. Journal of Clinical Psychology, 44 4-33.

Joseph, R. (1986). Reversal of language and emotion in a corpus callosotomy patient. Journal of Neurology, Neurosurgery, & Psychiatry, 49, 628-634.

Joseph, R. (1986). Confabulation and delusional denial: Frontal lobe and lateralized influences. Journal of Clinical Psychology, 42, 845-860.

Joseph, R. (1988) The Right Cerebral Hemisphere: Emotion, Music, Visual-Spatial Skills, Body Image, Dreams, and Awareness. Journal of Clinical Psychology, 44, 630-673.

Joseph, R. (1988). Dual mental functioning in a split-brain patient. Journal of Clinical Psychology, 44, 770-779.

Joseph, R. (1992) The Limbic System: Emotion, Laterality, and Unconscious Mind. The Psychoanalytic Review, 79, 405-455.

Joseph, R. (1996). Neuropsychiatry, Neuropsychology, Clinical Neuroscience, 2nd Edition. Williams & Wilkins, Baltimore.

Joseph, R. (1998). Traumatic amnesia, repression, and hippocampal injury due to corticosteroid and enkephalin secretion. Child Psychiatry and Human Development. 29, 169-186.

Joseph, R. (1999a). Frontal lobe psychopathology: Mania, depression, aphasia, confabulation, catatonia, perseveration, obsessive compulsions, schizophrenia. Psychiatry, 62, 138-172.

Joseph, R. (1999b). The neurology of traumatic "dissociative" amnesia. Commentary and literature review. Child Abuse & Neglect. 23, 71-80.

Joseph, R. (2000). Limbic language/language axis theory of speech. Behavioral and Brain Sciences. 23, 439-441.

Joseph, R. (2001). The Limbic System and the Soul: Evolution and the Neuroanatomy of Religious Experience. Zygon, the Journal of Religion & Science, 36, 105-136.

Joseph, R., & Casagrande, V. A. (1978). Visual field defects and morphological changes resulting from monocular deprivation in primates. Proceedings of the Society for Neuroscience, 4, 1978, 2021.

Joseph, R. & Casagrande, V. A. (1980). Visual field defects and recovery following lid closure in a prosimian primate. Behavioral Brain Research, 1, 150-178.

Joseph, R., Forrest, N., Fiducia, N., Como, P., & Siegel, J. (1981). Electrophysiological and behavioral correlates of arousal. Physiological Psychology, 1981, 9, 90-95.

Joseph, R., Gallagher, R., E., Holloway, J., & Kahn, J. (1984). Two brains, one child: Interhemispheric transfer and confabulation in children

aged 4, 7, 10. Cortex, 20, 317-331.

Joseph, R., & Gallagher, R. E. (1985). Interhemispheric transfer and the completion of reversible operations in non-conserving children. Journal of Clinical Psychology, 41, 796-800.

Nadel, L. (1991). The hippocampus and space revisited. Hippocampus, 1, 221-229.

Neumann, J. von, (1937/2001), "Quantum Mechanics of Infinite Systems. Institute for Advanced Study; John von Neumann Archive, Library of Congress, Washington, D.C.

Neumann, J. von, (1938), On Infinite Direct Products, Compositio Mathematica 6: 1-77.

Neumann, J. von, (1955), Mathematical Foundations of Quantum Mechanics, Princeton, NJ: Princeton University Press.

Noyes, R., & Kletti, R. (1977). Depersonalization in response to life threatening danger. Comprehensive Psychiatry, 18, 375-384.

O'Keefe, J. (1976). Place units in the hippocampus. Experimental Neurology, 51-78-100. Pais, A. (1979). Einstein and the quantum theory, Reviews of Modern Physics, 51, 863-914.

Penfield, W. (1952) Memory Mechanisms. Archives of Neurology and Psychiatry, 67, 178-191.

Penfield, W., & Perot, P. (1963) The brains record of auditory and visual experience. Brain, 86, 595-695.

Rawlins, M. (1978). Beyond Death's Door. Sheldon Press.

Ring, K. (1980). Life at Death: A Scientific Investigation of the Near-Death Experience. New York: Quill.

Sabom, M. (1982). Recollections of Death. New York: Harper & Row.

Southard, E. E. (1919). Shell-shock and other Neuropsychiatric Problems. Boston.

Sperry, R. (1966). Brain bisection and the neurology of consciousness. In F. O. Schmitt and F. G. Worden (eds). The Neurosciences. MIT press.

van der Kolk, B. A. (1985). Psychological Trauma. American Psychiatric Press.

Williams, D. (1956). The structure of emotions reflected in epileptic experiences. Brain, 79, 29-67.

Wilson, I. (1987). The After Death Experience. Morrow.

Wilson, M. A., & McNaughton, B. L. (1993). Dynamics of the

hippocampus ensemble for space. Science, 261, 1055-1058.

38. The Quantum Physics of God and the Conscious Universe

R. Gabriel Joseph
Cosmology.com / BrainMind.com

ATOMISTS VS CREATIONISTS

For thousands of years humans have gazed into the heavens pondering the nature of universe, with some arguing the Universe was created, and others championing an eternal, infinite cosmos, in continual flux and change, and with no beginning and no end. This latter view, developed by the Greek "atomists", and the ancient Hindus and Buddhists, was the prevailing theory accepted by most scientists until the 20th century, when the creationists, with the backing of the Catholic Church, came up with a scientific explanation for "the creation" which was eventually accepted by the majority of scientists. Ironically, it was Fred Hoyle, a leading proponent of an infinite universe, who dismissively coined the phrase which popularized the creationist theory. Hoyle called it: "the big bang."

It was in 1927 that Monsignor Georges Lemaître, published what became known as the theory of the big bang. His paper was titled "A homogeneous Universe of constant mass and growing radius accounting for the radial velocity of extragalactic nebulae." Lemaître designed and based his big bang theory on the Biblical story of Genesis. Lemaître hoped to make the Bible scientific and in accord with testable observations. The universe, he said, was created by a creator, as detailed in Genesis, chapter 1: "In the beginning God created the heavens...And God said, Let there be light: and there was light. And God saw the light, that it was good: and God divided the light from the darkness."

Lemaître initially called his theory the 'hypothesis of the primeval atom" and described it as "the Cosmic Egg exploding at the moment of the creation." Today is is known as "The Big Bang."

Lemaître's physics, as Lemaître admitted, had a spiritual foundation. Monsignor Lemaître firmly believed Jesus Christ was God and God created

the universe, as advocated by the Catholic Church and as described in Genesis 1. Lemaître was in fact an honorary prelate with the rank of Bishop in the Catholic Church, a professor at the Catholic University of Leuven. and president of the Pontifical Academy of Sciences which is under the direction and authority of the Pope of the Catholic Church. Lemaître's "big bang" theory was in accordance with the teachings of the Church, was supported by the Pope, and backed by the authority of the Bible.

The Universe was created. God created the Universe.

For thousands of years, however, other scientists, philosophers and sages, have argued the universe is infinite and eternal, and that the very foundation of existence, undergoes constant change. For example the Greek "atomists" Democritus, Anaxagoras and Epicurus argued that the universe was infinite; that permanence was an illusion--a manifestation of the act of observing and the limitation of the senses.

As their name suggests, the "atomists" based their reasoning on atomic theory which they originated. Specifically, in the fifth century B.C. Democritus and Anaxagoras proposed that all matter is made up of tiny indestructible units, called atoms. According to Democritus, these atoms move about in space and combine in various ways to give shape and form to all macroscopic objects.

Anaxagoras argued that the fundamental unit of matter, the atom, could neither be created nor destroyed—perhaps the earliest formulation of the law of conservation of mass. All matter was comprised of smaller elements called "atoms"which have always existed and which could not be created. Therefore the essence of existence, including the universe which is made of atoms, has no beginning but has existed for all of time. There was thus no need for a creator god.

The atomists were repeatedly assailed and attacked by Jewish philosophers and religious authorities who described these theories as "heresy." Attacks against the "atomists" continued with the establishment of the Catholic Church who labeled all atomists "heretics" and "blasphemers."

Supporters of the atomists countered: if there is a god, then who created god? The theologians replied: God the creator, became the creator at the moment of creation, just as a carpenter becomes a carpenter at the moment he first builds something. Thus it was argued that god existed before the creation, and it was only at the moment of creation, that god became "god the

creator."

Hence, the "creation-event" which gave rise to the universe was created by an all powerful omnipotent Lord God who existed prior to and is responsible for the creation event; exactly as described in Genesis 1. God is self-creating. In fact, similar arguments have been put forth by those supporting the theory of the big bang: the universe did not exist until it was created, and existed as a singularity or as a nothingness prior to the creation event. The universe created itself.

The theory of the big bang creation event, and the argument in favor of god the creator, rely upon similar philosophical arguments. Prior to the big bang there was nothing, or a singularity which for unknown reasons exploded and became the universe. God was the singularity which created the universe, and thus god and the universe are self-creating: the universe became the universe at the moment of creation, and god the creator became "god the creator" at the moment of creating the universe.

Be it God or a "big bang" creation event, both theories rest upon the same belief: something always existed, i.e. "god" and/or the "singularity." And both god and the universe are self-creating. God became god by creating the universe and thus God created God by the act of creation. The Universe became the universe by creating itself and thus the universe created the universe by the act of creation. Be it the Jewish/Christian religion, or the "big bang" theorists, all assume something existed which gave rise to the universe; i.e. god or a singularity.

According to Lemaître, God is that singularity. The universe, therefore, is not just a manifestation of the creative act, but is also god. The universe is god since all things come from God. Every galaxy, stars, planet, human, dog, cat, molecule, atom--all come from God, and in the beginning were one with god--this singularity. And in the end, all will return to god, becoming one with god. So in the end, is, as the beginning: A oneness from which all existence emanates and returns. The parallels with Hinduism, Taoism, atomic theory, and quantum physics--as will be explained--are striking.

THE HINDU UNIVERSE: THE UPANISHADS / THE BHAGAVAD-GITA

In HinduVedic literature, it is said that Visnu is the primary creator who creates the basic universal shell and provides all the raw materials for what is

perceived as the material world.

“In the beginning of the creation, the Lord first expanded Himself in the universal form of the puruṣa incarnation and manifested all the ingredients for the material creation. And thus at first there was the creation of the sixteen principles of material action. This was for the purpose of creating the material universe.” -The Bhagavad-gītā

“This form [the manifestation of the puruṣa] is the source and indestructible seed of multifarious incarnations within the universe. From the particles and portions of this form, different living entities, like demigods, men and others, are created.” -The Bhagavad-gītā

“Not-being was this in the beginning; From it arose. Self-fashioned indeed out of itself.” -Upanishads

“Invisible, incomprehensible, without genealogy, colorless, Without eye or ear, without hands or feet, Eternal, pervading all and over all, scarce knowable, That unchanging one Whom the wise regard as being’s womb.” -Upanishads

THE TAO

“All things begin from nothing and end in nothing.” -Chang Tzu

“This is the Tao--it may be apprehended by the mind, but it cannot be seen. It has Its root and ground of existence in Itself. Before there was heaven and Earth, It was securely existing. From It came the mysterious existences of spirits, from It the mysterious existence of God. It produced heaven. It produced Earth.” -Chang Tzu

“From nonexistence we proceed to existence.”-Chang Tzu

“Heaven, Earth, and I were produced together; and all things and I are one.” -Chang Tzu

“It is from the nameless that Heaven and Earth sprang.” -Tao Te Ching

“The nameless Tao was the beginning of Heaven and Earth and was before God.” -Tao Te Ching

“There was something undefined and complete, coming into existence before Heaven and Earth; formless, reaching everywhere and in no danger of being exhausted. It may be regarded as the Mother of all things.” -Tao Te Ching

THE JEWISH / CHRISTIAN GOD

“Lift up your eyes and look to the heavens:
Who created all these?
He who brings out the starry host one by one
and calls forth each of them by name.” -Isaiah 40:26

“...when I was being made in secret,
intricately woven in the depths...
Your eyes saw my unformed substance...the days that were formed for me,
when as yet there was none of them” - Psalm 139

“He reveals deep and hidden things;
he knows what lies in darkness,
and light dwells with him” - Daniel 2:22

“The secret things belong to God, but the things revealed belong to us” - Deuteronomy 29:29...

“I am God... declaring the end from the beginning” -Isaiah 46

CONSCIOUSNESS CREATED THE UNIVERSE

But what exactly was that “creative act”? How did non-being produce being? If there is a god, how did “god” create? How did “god the creator” create “god the creator”? The same questions have been asked about the “big

bang." What caused it and why?

How do we know something exists?

One answer might be: Consciousness. Consciousness, exists. Consciousness has energy. Energy may become matter and matter, energy. Consciousness is always a consciousness of something. Consciousness requires a duality in order to exist as a consciousness. Self-consciousness, consciousness of consciousness, is also a duality.

As summed up the Heisenberg, one of the founders of quantum mechanics: "the transition from the possible to the actual takes place during the act of observation... and the interaction of the object with the measuring device, and thereby with the rest of the world...Since through the observation our knowledge of the system has changed discontinuously, its mathematical representation has also undergone the discontinuous change and we speak of a quantum jump" (Heisenberg, 1958). In other words, something comes into existence, by becoming conscious of it.

Heisenberg (1958), cautioned, however, that the observer is not the creator of reality, but instead merely registers, at a particular moment, certain isolated fragments of activity within the continuum, the nature of which is determined by our senses which perceives only parts and not the continuum which the part is, part of: "Quantum theory does not introduce the mind of the physicist as part of the atomic event. But it starts from the division of the world into the object and the rest of the world. What we observe is not nature in itself but nature exposed to our method of questioning."

The act of knowing, of observing, or measuring, that is, interacting with the environment in any way, creates an entangled state and a knot in the quantum continuum described as a "collapse of the wave function;" a knot of energy that is a kind of blemish in the continuum of the quantum field. This quantum knot bunches up at the point of observation, at the assigned value of measurement and can be entangled. Consciousness perceives a blemish in the continuum, but which is still part of the continuum, even though it is perceived as distinct.

The universe exists, because there is consciousness of the universe. This also means: consciousness must have come first, creating a quantum jump from singularity to duality. The universe may have become conscious of itself.

If the universe is a conscious universe, then it could be said that the

universe came into being when the universe became conscious of itself. Likewise, if there is a "god" then it could be said that God created the universe and became god the creator, by becoming conscious of itself; that is, god became god the creator at the moment god achieved self-consciousness. If there is a a "God" and "god" and the universe are "one" then the god-universe became conscious of itself and thus the universe and god came into existence. Consciousness was the creative act. Consciousness creates by becoming conscious.

In the Upanishads, it is stated: "In the beginning the atman was this universe. He gazed around, he saw nothing there but himself. Thereupon he cried out at the beginning: It is I."

Thus, in the beginning, atman and the universe were a singularity, a oneness. However, upon becoming conscious of its existence, the universe came into existence, but as a duality:

"Not-being was this in the beginning; From it arose. Self-fashioned indeed out of itself." -Upanishads

The act of becoming conscious, created a duality also known as Brahman and Atman:

"Brahman...After he had created it, he entered into it; after he had entered into it, he was: The being and the beyond, Expressible and inexpressible, Founded and foundationless. Consciousness and unconsciousness; Reality and unreality... In truth, there are two forms of Brahman, The formed and the unformed, The mortal and immortal. The abiding and the fleeting, The being and the beyond....Truly the Brahman is this Atman." -Upanishads

It is the Atman, consciousness/self-consciousness which creates the universe, thereby creating a duality of Brahman and Atman--a universe which is conscious of itself. Brahman is the unknown that needs to be explained, atman is the known through which the unknown finds its explanation. Brahman and Atman became a duality, upon achieving self-consciousness; and this is how "god" and the universe came into being, according to the Upanishads.

Genesis, chapter 1: “In the beginning God created the heavens...And God said, Let there be light: and there was light. And God saw the light, that it was good: and God divided the light from the darkness.” What is this light? It is the illumination of consciousness.

THE QUANTUM CONTINUUM: BEING AND NON-BEING

As pointed out by Neils Bohr and Werner Heisenberg, the founders of quantum theory, there are direct parallels between quantum mechanics and Taoism, Buddhism, and Hinduism: “The great scientific contributions in theoretical physics... has.. a relationship between the philosophical ideas in the tradition of the Far East and the philosophical substance of quantum theory.” -Werner Heisenberg

Being become nonbeing, and nonbeing becoming being, is a major principle of quantum physics. Form and substance are manifestations of dynamic patterns of energy and electromagnetic radiation that have no material reality. Form and substance, that is, the “particles” they are comprised of, exist only as probabilities. Form and substance have probable realities and can become something else entirely, or cease to exist, returning to the basic oneness of the continuum--the most obvious example of which, is, death and decay. What is, can undergo a transformation from being into nonbeing

Consider the theoretical molecular foundations of matter, e.g., electrons, protons, neutrons, photons, neutrinos, etc., Each of these “particles” consist of yet smaller particles and all are balanced by the existence of anti-particles which are in all respects opposite in charge. However, in some instances, these elements also comprise their own anti-particle. Thus, there is being, and anti-being.

However, according to quantum mechanics, these particles do not really exist, except as probabilities. These “subatomic” particles have probable existences and display tendencies to assume certain patterns of activity that we perceive as shape and form by a conscious mind wielding an measurement apparatus. Yet, they may also begin to display a different pattern of activity such that being can become nonbeing or something else altogether.

Shape and form are a function of our perception of these dynamic interactions within the frenzy of activity which is the quantum continuum.

However, we can only perceive what our senses can detect, and what we detect as form and shape are really a mass of frenzied subatomic electromagnetic activity that is amenable to detection by our senses and conscious mind at a particular moment in time. The perception and our consciousness of certain aspects of these oscillating patterns of activity are dependent on our sensory capabilities, which give rise to the impressions of shape and form. If we possessed additional senses, or an increased sensory channel capacity, we would perceive yet other patterns and other realities.

More specifically, this electromagnetic activity is so frenzied, that a particle can exist here, and now there. Although it is neither here nor there, it is perceived by consciousness as a solid object that has shape, form, length, mass, weight, and so on. This is because the rapidity of movement obscures the fact that much of what we perceive are particular patterns of electromagnetic activity that are in frenzied motion.

Mass, as Einstein explained in his famous equation, is energy. That is, mass (M) is equal to energy (E) divided by the speed of light squared ($M=E/C^2$). However, whereas mass can be destroyed, energy cannot. Rather, as mass is destroyed, an equal amount of energy is released back into the electromagnetic continuum. The energy released as a function of destruction, is equal to the mass of the object times the square of the speed of light ($E=MC^2$). Conversely, if we increase the amount of energy, we increase the amount of apparent mass.

Since energy cannot be created, then energy was never created and has existed always.

Mass does not consist of tiny particles that are packed tightly together. Rather, what we perceive as mass (shape, form, length, weight) are dynamic patterns of energy which we selectively attend to and then perceive as stable and static. And, we are perceiving only fragments of the quantum continuum.

This energy that makes up the object of our conscious perceptions, is but an aspect of the electromagnetic continuum which has assumed a specific pattern that may be sensed and processed by our brain. As dictated by quantum mechanics, the universe exists, because we are conscious of it.

Hence, consciousness created the universe. If the universe is self-creating, then the universe became conscious of itself.

THE TAO OF QUANTUM CONSCIOUSNESS

If the universe came into being by becoming conscious if itself, then what is, or was, the singularity, this oneness, before it became conscious of itself?

“The nameless Tao was the beginning of Heaven and Earth and was before God.” -Tao Te Ching

According to the Taoists, the basic oneness is not compacted into a single point, but is all pervasive, everywhere, at the same time; and not only do all things emerge from it, but all things return to it, becoming one:

“Tao is forever...All pervading is the Great Tao. It may be found on the left hand and on the right. All things depend on it for their production.. All things return to their root and disappear and do not know that it is it which presides over their doing.” -Tao Te Ching

“The Tao passes on in constant flow. Passing on it becomes remote. Having become remote, it returns.” -Tao Te Ching

“The Tao produces all things and nourishes them; it produces them and does not claim them as its own; it does all; it presides over all, yet does not control. This is what is called the Mystery of Tao.” -Tao Te Ching

“In Tao the only motion is returning. Although Heaven and Earth were produced by being, being was produced by nonbeing.” -Tao Te Ching

“Endless the series of things without a name on the way way to where there is nothing. They are called shapeless shapes; Forms without form; are called vague semblances.” -Tao Te Ching

“This endless cycle of being emerging from non-being, and returning to its source, is consistent with quantum theory, i.e. the quantum continuum of electromagnetic activity, from which all existence arises and returns; and similar ideas are repeated in the Upanishads:

“In Him in whom this universe is interwoven; Whatever moves or is motionless, In Brahman everything is lost; Like bubbles in the ocean. In whim in whom the living creatures of the universe Emptying themselves

become invisible. They disappear and come to light again. As bubbles rise to the surface." -Upanishads

"After he had created it, he entered into it; after he had entered into it, he was: The being and the beyond... Reality and unreality... The formed and the unformed, The mortal and immortal. The abiding and the fleeting, The being and the beyond. -Upanishads

The central view of Upanishads and the Tao, and which is consistent with quantum mechanics, is the cyclic nature of non-being becoming being, being becoming non-being--ceaseless motion and constant change: "Returning is the motion of Tao... and going far means returning." (Lao Tzu)

This cyclic change of continual motion is also represented by the Chinese concepts of yin and yang: "The yang having reached its end become yin; the yin having reached its end becomes the yang." -I Ching. Book of Changes

Its tao is forever changing -alteration, movement without rest, Flowing through the six empty places, Rising and sinking without fixed law; Firm and yielding transform each other. They cannot be confined within a rule. It is only change that is at work here." -I Ching. Book of Changes

What was the singularity which existed before the universe or the god/universe became the god/universe? The quantum continuum, which is forever changing. At the moment that quantum continuum became conscious of itself, the universe was created: being emerged from non-being.

QUANTUM CONSCIOUSNESS vs EINSTEIN

Einstein ridiculed the implications of quantum theory and its emphasis on consciousness as having any role in the nature of existence: "Do you really think the moon isn't there if you aren't looking at it?"

As theorized by Einstein (1961), and unlike the Copenhagen model of quantum physic, space-time is relative to but independent of any observer. Consciousness and the act of measurement is relative but irrelevant having no effect on the passage of time or events. In relativity, each event, which occurs

at certain moments of time, in a given region of space, and are relative to those observers in different regions of space. Each observer chooses a convenient metrical coordinate system in which these events are specified by four real numbers.

In relativity, consciousness is merely relative. In quantum physics, consciousness and the act of observation and measurement constitute a separate reference frame which can collapse the wave function of the quantum continuum and register entangled interactions within the environment. Consciousness by the act of observation or measurement takes a static or series of pictures-in-time which then becomes discontinuous from the quantum continuum (Heisenberg 1958; Planck 1931; von Neumann 2001). These entanglements (Francis 2012; Juan et al. 2013; Plenio 2007), or blemishes in the quantum continuum, may be observed as shape, form, cause, effect, past, present, future, the passage of time, and thus reality; the result of a decoupling of quanta from the quantum (coherent) continuum which leaks out and then couples together in a knot of activity which is observed as a wave form collapse.

As based on the Copenhagen theory of quantum mechanics (Bohr, 1958, 1963; Heisenberg 1955, 1958), what we perceive as reality are a manifestation of wave functions and alterations in patterns of activity within the quantum continuum which are perceived by consciousness as discontinuous. Wave form collapse is always a matter of probability, and is non-local, indeterministic and a consequence of conscious observation, measurement, and entanglement. Consciousness and the act of measurement, therefore, are entangled with the quantum continuum and can after the continuum and the space-time manifold.

In summary, form and substance are comprised of particles which take on specific patterns and which are the result of concentrations of energy that emerge and disappear back into the electromagnetic quantum field; a knot of energy that is a kind of blemish in the continuum of the quantum field which is perceived by a conscious mind.

This reality, therefore, is a manifestation of consciousness and consciousness of alterations in the patterns of activity within the electromagnetic field. The electromagnetic field, this energy, is therefore the fundamental entity, the continuum that is constitutes the basic oneness and unity of all things.

QUANTUM PHYSICS AND PROBABILITY OF EXISTENCE

Einstein and his followers waged war against quantum theory which posed a direct challenge to his theories and those of Newton. For example, the equations of Newton and Einstein were replaced by equations between matrices representing the position and momentum of electrons which were found to be unpredictable. In fact, whereas Newtonian and Einsteinian theories do an admirable job of explaining the macro-world, they completely break down when applied to the sub-atomic world. This is because the patterns that resemble particles, display tendencies to exist and tendencies to no longer exist. Thus measurement becomes uncertain and can only be based on probabilities.

Because particles have only a probable existence it is impossible to predict an atomic event with 100% certainty. This principle, in fact, is called the uncertainty principle, because one can never predict when a particle may exist, and where it may exist when it does exist. Again, these particles exist and do not exist, and are always in motion--which gives rise to the illusion of permanent shape and form when perceived or measured by a conscious mind. It is also these principles which form the crux of quantum electrodynamics, or field theory.

Broadly considered, atoms consist of empty space at the center of which is a positively charged nucleus and which is orbited by electrons. The positive charge of the atom's nucleus determines the number of surrounding electrons, making the atom electrically neutral. However, it was determined that it was impossible to make precise predictions about the position and momentum of electrons based on Newtonian or Einsteinian physics, and this led to the Copenhagen interpretation (Heisenberg 1925, 1927) which Einstein repeatedly attacked because of all the inherent paradoxes. Matrix mechanics is referred to now as quantum mechanics whereas the "statistical matrix" is known as the "probability function;" all of which are central to quantum theory.

As summed up by Heisenberg (1958) "the probability function represents our deficiency of knowledge... it does not represent a course of events, but a tendency for events to take a certain course or assume certain patters. The probability function also requires that new measurements be made to determine the properties of a system, and to calculate the probable result of

the new measurement; i.e. a new probability function."

Quantum physics, as exemplified by the Copenhagen school (Bohr, 1934, 1958, 1963; Heisenberg, 1925, 1927, 1930), like Einsteinian physics, makes assumptions about the nature of reality as related to an observer, the "knower" who is conceptualized as a singularity. As summed up by Heisenberg (1958), "the concepts of Newtonian or Einsteinian physics can be used to describe events in nature." However, because the physical world is relative to being known by a "knower" (the observing consciousness), then the "knower" can influence the nature of the reality which is being observed through the act of measurement and registration at a particular moment in time.

And yet, what is observed or measured at one moment can never include all the properties of the object under observation. In consequence, what is known vs what is not known, becomes relatively imprecise (Bohr, 1934, 1958, 1963; Heisenberg, 1925, 1927).

As expressed by the Heisenberg uncertainty principle (Heisenberg, 1927), the more precisely one physical property is known the more unknowable become other properties. The more precisely one property is known, the less precisely the other can be known and this is true at the molecular and atomic levels of reality. Therefore it is impossible to precisely determine, simultaneously, for example, both the position and velocity of an electron (Bohr, 1934, 1958, 1963).

Einstein objected to quantum mechanics and Heisenberg's formulations of potentiality and indeterminacy by proclaiming "god does not play dice."

In Einstein's and Newton's physics, the state of any isolated mechanical system at a given moment of time is given precisely. Numbers specifying the position and momentum of each mass in the system are empirically determined at that moment of time of the measurement. Probability never enters into the equation. Therefore, the position and momentum of objects including subatomic particles are precisely located in space and time as designated by a single pair of numbers, all of which can be determined causally and deterministically. However, quantum physics proved that Einstein and Newton's formulation are not true at the atomic and subatomic level (Bohr, 1934, Born et al. 1925; Heisenberg 1925, 1927).

According to Heisenberg (1925, 1927, 1930), chance and probability enters into the state and the definition of a physical system because the very

act of measurement can effect the system; and this is because the observing consciousness and measurement apparatus are also entangled with the quantum continuum and effect it, and vice-verse. No system is truly in isolation, but is contiguous with the quantum continuum. Moreover, no system can be viewed from all perspectives in totality simultaneously which would require a god's eye view; and "god's eye" would also have to observe itself observing. Only if the entire universe is included can one apply the qualifying condition of "an isolated system." By including the observer, his eye, the measuring apparatus and the object, creates uncertainty because every action is entangled with the continuum.

"This crucial point...implies the impossibility of any sharp separation between the behaviour of atomic objects and the interaction with the measuring instruments which serve to define the conditions under which the phenomena appear...." -Bohr 1949.

As determined by Niels Bohr (1949), the properties of physical entities exist only as complementary or conjugate pairs: duality. A profound aspect of complementarity is that it not only applies to measurability or knowability of some property of a physical entity, but more importantly it applies to the limitations of that physical entity's very manifestation of the property in the physical world. Physical reality is defined by manifestations of properties which are limited by the interactions and trade-offs between these complementary pairs. For example, the accuracy in measuring the position of an electron requires a complementary loss of accuracy in determining its momentum. Precision in measuring one pair is complimented by a corresponding loss of precision in measuring the other pair (Bohr, 1949, 1958, 1963). The ultimate limitations in precision of property manifestations are quantified by Heisenberg's uncertainty principle and matrix mechanics. Complementarity and Uncertainty dictate that all properties and actions in the physical world are therefore non-deterministic to some degree.

Bohr (1949) called this the principle of complementarity, a concept fundamental to quantum mechanics and closely associated with the Uncertainty Principle. "The knowledge of the position of a particle is complementary to the knowledge of its velocity or momentum." If we know the one with high accuracy we cannot know the other with high accuracy (Bohr, 1949, 1958, 1963; Heisenberg, 1927, 1955, 1958).

THE WAVE FUNCTION OF REALITY

In quantum physics, nature and reality are represented by the quantum state. The electromagnetic field of the quantum state is the fundamental entity, the continuum that constitutes the basic oneness and unity of all things. The physical nature of this state can be "known" by assigning it mathematical properties and probabilities (Bohr, 1958, 1963; Heisenberg, 1927). Therefore, abstractions, i.e., numbers and probabilities become representational of a hypothetical physical state. Because these are abstractions, the physical state is also an abstraction and does not possess the material consistency, continuity, and hard, tangible, physical substance as is assumed by Classical (Newtonian) physics. Instead, reality, the physical world, is a process of observing, measuring, and knowing and is based on probabilities and the wave function (Heisenberg, 1955).

Central to quantum mechanics is the wave function (Bohr, 1963; Heisenberg, 1958). All of existence has a wave function, including light. Every aspect of existence can be described as sharing particle-like properties and wave-like properties. The wave function is the particle spread out over space and describes all the various possible states of the particle. According to quantum theory the probability of findings a particle in time or space is determined by the probability wave which obeys the Schrodinger equation. Everything is reduced to probabilities. Moreover, these particle/waves and these probabilities are entangled.

The act of conscious observations, by perception, by using a measuring device, interacts with the quantum continuum, because it is part of and entangled with the continuum. By becoming conscious, by focusing the conscious mind (or measuring device) at a particular area of the quantum continuum, triggers a "wave form collapse"--and it is this collapse of the wave function which gives rise to the perception of galaxies, stars, planets, moons, Earth, people, dogs, cats, and molecules.

Wave function collapse has also been described as "decoherence." The wave function describes all the various possible states of the particle. Rocks, trees, cats, dogs, humans, planets, stars, galaxies, the universe, the cosmos, past, present, future, as a collective, all have wave functions. The universe as a whole, has a wave function. If there is a god, then god has a wave function.

Waves can also be particles, thereby giving rise to a particle-wave duality and the Uncertainty Principle. Particle-waves interact with other particle-

waves. The wave function of a person sitting on their rocking chair would, within the immediate vicinity of the person and the chair, resemble a seething quantum cloud of frenzied quantum activity in the general shape of the body and rocking chair. This quantum cloud of activity, when perceived by a conscious mind, gives shape and form to the man in his chair, even though the man/chair is part of the quantum continuum. The man/chair is a blemish in the continuum which is still part of the continuum and interacts with other knots of activity thus giving rise to cause and effect as well as violations of causality: "spooky action at a distance."

Reality is a manifestation of wave functions and alterations in patterns of activity within the quantum continuum which are entangled and perceived by conscious observations and measurement. When perceived, the wave function collapses and becomes discontinuous from the continuum, even though it is still part of it. The perception of a structural unit of information is not just perceived, but is inserted into the quantum state which causes the reduction of the wave-packet and the collapse of the wave function. It is this collapse which describes shape, form, length, width, and future and past events and locations within space-time (Bohr, 1963; Heisenberg, 1958).

In quantum physics, the wave function describes all possible states of the particle and larger objects, thereby giving rise to probabilities, and this leads to the "Many Worlds" interpretation of quantum mechanics (Dewitt, 1971; Everett 1956, 1957). That is, since there are numerous if not infinite probable outcomes, each outcome and probable outcome represents a different "world" with some worlds being more probable than others.

In the Copenhagen model, objects are viewed as quantum mechanical systems which are best described by the wave function and the probability function. "The reduction of wave packets occurs when the transition is completed from the possible to the actual" (Heisenberg, 1958).

Likewise, it could be said that the universe underwent a transition from the possible to the actual, at the moment of conscious registration which triggered a wave form collapse.

The measuring apparatus, the observer, and the conscious mind of the observer, also have a wave function and therefore interact with what is being measured. The effect of this is obvious when its a macro-structure measuring a micro-structure vs a macro-structure measuring a macro-structure. According to the Copenhagen interpretation (Bohr, 1949, 1963; Heisenberg,

1958), it is the act of measurement which collapses the wave function. It is also the measurement and observation of one event which triggers the instantaneous alteration in behavior of another object at faster than light speeds; i.e. entanglement. However, that which takes place faster than the speed of light means that an event in the future can travel from the future into the present and then into the past. Therefore, the future can effect the present and the past.

For example, an electron may collide with and bounce to the left of a proton on one trial, then to the right on the next, and then at a different angle on the third trial, and another angle on the fourth and so on, even though conditions are seemingly identical. This gives rise to the Uncertainty Principle and this is why the rules of quantum mechanics are indeterministic and based on probabilities. The state of a system one moment cannot determine what will happen next. Instead, we have probabilities which are based on the wave function. The wave function describes all the various possible states of the particle (Bohr, 1963; Heisenberg, 1958).

THE WAVE FUNCTION OF GOD/UNIVERSE CONSCIOUSNESS

From a singularity, out of nothingness, emerged the universe which emerged upon becoming conscious of itself. By becoming conscious, this caused a "collapse of the wave function" and the universe underwent a transition "from the possible to the actual" (Heisenberg, 1958).

Thus, if the universe became conscious of itself, it collapsed the wave function and the universe was transformed into the actual. If there is a god, and if the universe is god, then god is that quantum consciousness which created itself and the universe, by becoming conscious.

A conscious universe, or rather, a quantum consciousness which is identical with and yet distinct from the quantum continuum, is predicted by quantum physics, the theories of the "atomists" and the "Eastern" philosophies of Hinduism, Buddhism, and Taoism: the act of perceiving, of being conscious, creates an impression of distinction, of unique individuality; when in fact what is perceived are only fragments of the totality which is all.

Some Big Bang theorist like to believe the hypothetical "singularity" that gave rise to the universe, may have initially existed as a solid mass, no larger than a Plank length; with all matter compacted into the smallest of all measurable space. And then it exploded outward. However, as predicted by

quantum mechanics, and Newtonian and Einsteinian physics, the gravity would be so immense that instead of blowing outward, it would have blown inward, imploding, creating a hole in the fabric of space-time; at the bottom of which would be a mirror universe. Thus, a universe of matter and a universe of anti-matter, a duality, would have been fashioned by the creative event. Two universes, being and non-being, matter and anti-matter, and each conscious of the others' existence.

This singularity, this basic oneness, from the perspective of quantum mechanics, need not have been compacted, however, but exists as a quantum continuum forever in flux, from which being emerges from non-being at the moment of consciousness of it. That is, when the singularity became conscious of itself, by becoming conscious of the "singularity", this created a fragmentation within the quantum continuum, the basic oneness which is everything. The quantum continuum became discontinuous by the act of becoming conscious. Again, consciousness, to be consciousness, must be consciousness of something; and that something is distinct from consciousness. Even consciousness of consciousness (self-consciousness) creates a duality which may then become a multiplicity (Joseph 2011).

In other words, by becoming a conscious observer, fragments of the quantum continuum were observed as distinct from the continuum, and perceived as galaxies, stars, planets, molecules, atoms, particles. And collections of those molecules and atoms also became conscious of themselves as things, and were perceived as having shape, form, with length, width, height, weight, duration, and individual identities. The quantum continuum, as a quantum consciousness, begets not just self-consciousness, but islands of consciousness: consciousness begets itself.

THE CONSCIOUS UNIVERSE

Since the universe, as a collective, must have a wave function, then this universal wave function would describe all the possible states of the universe and thus all possible universes. Hence, there must be multiple universes which exist simultaneously as probabilities (Dewitt, 1971; Everett 1956, 1957).

And if there is a god, the same would be true of "god" and the universe as a whole. "God" and the universe would have a wave function. Therefore, there would be more than one god--and this leads to the Hindu religion with

its millions of gods, each of which is actually a manifestation of the one god which is the universe.

Consciousness, too, would have a wave function. In consequence, because the wave function of consciousness is entangled with the quantum continuum it can cause a collapse of the wave function.

If consciousness is energy, then the energy which is the quantum continuum also has the probability of becoming conscious. If the universe, as a whole, is a manifestation of the quantum continuum, as perceived by consciousness, then the continuum could have become conscious of itself, and in achieving self-consciousness, created the universe, which, created itself by becoming conscious.

And if the wave function is consciousness, and if there is a god and that god is the universe, then god/universe became god/universe, when the quantum continuum became conscious.

"In the beginning the atman was this universe. He gazed around, he saw nothing there but himself. Thereupon he cried out at the beginning: It is I." - Upanishads

And from the quantum continuum, through quantum consciousness, the one became the many: galaxies, stars, planets, moons, people, dogs, cats, molecules....

"O Lord of the universe, O universal form, I see in Your body many, many arms, bellies, mouths, and eyes, expanded everywhere, without limit I see in You no end, no middle, and no beginning. You have numberless arms, and the sun and moon are Your eyes. I see You with blazing fire coming forth from Your mouth, burning this entire universe by Your own radiance." - The Bhagavad-gītā

Sūta said: In the beginning of the creation, the Lord first expanded Himself in the universal form of the puruṣa incarnation and manifested all the ingredients for the material creation. And thus at first there was the creation of the sixteen principles of material action. This was for the purpose of creating the material universe. -The Bhagavad-gītā

This form [the second manifestation of the puruṣa] is the source and indestructible seed of multifarious incarnations within the universe. From the particles and portions of this form, different living entities, like demigods, men and others, are created. -The Bhagavad-gītā

In Him in whom this universe is interwoven; Whatever moves or is motionless" -Upanishads

THE QUANTUM PHYSICS OF ALL KNOWING GOD

In a quantum universe all of existence consists of a frenzy of subatomic energetic activity which can be characterized as possessing pure potentiality, and all of which are linked and entangled as a basic oneness which extends in all directions and encompasses all dimensions including time (Bohr, 1958, 1963; Dirac, 1966a,b; Planck 1931, 1932, Heisenberg 1955, 1958; Joseph 2014; von Neumann 1937, 1955). If there is a "god" then that god is that basic oneness.

The quantum continuum is the ultimate reality, an all inclusive oneness which is all things, and which becomes all things at the moment of consciousness--and the same has been said of the Tao, Hindu, Christian, Buddhist, and Jewish god.

It has been said that "god" is all knowing, omnipotent, omnipresent, existing in the future and the past, and in all things and the same can be said of the quantum continuum. And because this frenzied electromagnetic continuum extends in all directions and dimensions, encompassing even what is experienced as time, then the continuum which could be described as "god" would encompass the future, present, and past, and thus, would be eternal and all knowing.

"The Supreme Truth exists both internally and externally, in the moving and nonmoving. He is beyond the power of the material senses to see or to know. Although far, far away, He is also near to all." --Bhagavad Gita, 13:16

The omniscience of God is to be all knowing, to know all things past, present and future, including what is hidden from human sight and knowledge--all is still known by God. God's knowledge originates in himself and is complete--so says the Tao, Apanishads, Bhagavad Gita, and the

Christian and Jewish religious texts (see Isa 40:13-14, Job 21:22, Mt 10:30, Dt 29:29).

"Who has directed the Spirit of the Lord
or instructed him as his adviser?
Whom did he consult?
Who gave him understanding?
Who taught him the right way?
Who taught him knowledge?
Who showed him the path to understanding?" -Isaiah 40:13-14

To be all-knowing is to be knowing of all time--time itself is but a manifestation of the oneness as experienced as a single moment, an eternal "now" by a conscious observer. According to Einstein, time is relative to the observer (Einstein 1905a,b,c, 1906, 1961). Since there are innumerable observers, there is no universal "past, present, future" which are infinite in number and all of which are in motion. However, as all observers are but blemishes in the electromagnetic continuum, knots of energy which perceive themselves as distinct but which are still entangled in the continuum, then the basic oneness of the continuum, consists of all observers and all pasts presents and futures--in which case, there is only one observer: the quantum consciousness which is the universe, and what some have described as Tao, and God. From a god's eye view, the eternal "now" consists of all pasts, presents, futures, which are one.

"....the days that were formed for me, when as yet there was none of them" - Psalm 139

"God" would thus encompass the past, present, and future, and would have consciousness of all pasts presents futures.

Because space is "isotropic" there is nothing in the law of physics indicating that a particular direction is preferred; down, up, sideways, backwards, its all the same. Why should space-time, or time, be any different? The laws of electromagnetism do not make a distinction between past and future (Pollack & Stump, 2001; Slater & Frank, 2011). Since the past, present and future overlap and are relative to observers and differ

according to location, gravity, and speed of movement, then as Einstein stated, the distinctions between them are an illusion.

Like a flowing river, the "present," "past" and "future" are relative to an observer, just as "downstream" is relative to the location of an observer. In quantum physics, the river has no present or past or future, it just is; and this is why events which, from the perspective of an observer, occur in the future, can effect events which take place in the present: the eternal now.

As demonstrated by what is known as "entanglement" (Plenio 2007; Juan et al. 2013; Francis 2012) effects cannot always be traced to an earlier cause, for the cause may occur in the future (Megidish et al 2013). Effects may occur simultaneously with causes, and take place at faster than light speeds (Francis 2012; Juan et al. 2013; Lee et al. 2011; Matson 2012; Plenio 2007). As indicated by entanglement, the future may effect or take place before the past-present (Megidish et al 2013).

GOD AS ENTANGLMENT: PAST PRESENT FUTURE ARE ONE

According to Einstein's theorems of relativity (Einstein 1905a,b,c, 1907, 1910, 1961), the past, present and future overlap and exist simultaneously but in different distant locations in the dimension known as space-time, and as such "The distinction between past, present and future is only an illusion" (Einstein 1955). Quantum physics, the Uncertainty Principle, the "Many Worlds" interpretation of quantum physics, and what Einstein (1930) called "spooky action at a distance" all call into question the causal distinctions between past, present and future.

As predicted by quantum mechanics and relativity, time is a circle--a closed loop with no beginning and no end--time is a continuum, where past, present, future, are linked and entangled. If there is a god, and if that god is the quantum continuum, then from the perspective of the god-continuum, time and god are one and the same, except at the moment of consciousness, which triggers a wave form collapse which is experienced as the eternal "now." God, the quantum continuum, is entangled with the future and the past, as all a basic oneness.

These are not just thought experiments. There is considerable evidence of what Einstein (1955) called "spooky action at a distance" and faster than light "entanglement" (Plenio 2007; Juan et al. 2013; Francis 2012). It is well established that causes and effects can occur simultaneously and ever faster

than light speed (Lee et al. 2011; Matson 2012; Olaf et al. 2003); a consequence of the connectedness of all things in the quantum continuum.

For example, entanglement, between photons, has been demonstrated even before the second photon even exists, such that the photon in the future effects the photon in the present; “a manifestation of the non-locality of quantum mechanics not only in space, but also in time (Megidish et al 2013). Time-space is interactional. Time, and time-space are embedded in the quantum continuum and can effect as well as be effected by other particle-waves even at great distances; a concept referred to as “entanglement.” Time and space-time are entangled in the continuum which is all things.

Consider photons which are easily manipulated. They preserve their coherence for long times and can be entangled by projection measurements (Weinfurter 1994; Kwiat et al. 1995). A pump photon, for example, can split light into two lower- energy photons while preserving momentum and energy, and these photons remained maximally entangled although separated spatially (Goebel et al 2008; Pan et al. 1998). However, entanglement swapping protocols can entangle two remote photons without any interaction between them and even with a significant time-like separation (Ma et al., 2012; Megidish et al. 2013; Peres 2000). In one set of experiments entanglement was demonstrated following a delayed choice and even before there was a decision to make a choice. Specifically, four photons were created and two were measured and which became entangled. However, if a choice was then made to measure the remaining two photons, all four became entangled before it was decided to do a second measurement (Ma et al., 2012; Peres 2000). Entanglement can occur independent of and before the act of measurement. “The time at which quantum measurements are taken and their order, has no effect on the outcome of a quantum mechanical experiment” (Megidish et al. 2013).

Moreover, “two photons that exist at separate times can be entangled” (Megidish et al. 2013). As detailed by Megidish et al (2013): “In the scenario we present here, measuring the last photon affects the physical description of the first photon in the past, before it has even been measured. Thus, the ”spooky action” is steering the system’s past. Another point of view...is that the measurement of the first photon is immediately steering the future physical description of the last photon. In this case, the action is on the future of a part of the system that has not yet been created.”

Hence, entanglement, between photons has been demonstrated even before the second photon even exists; "a manifestation of the non-locality of quantum mechanics not only in space, but also in time (Megidish et al 2013). In other words, a photon may become entangled with another photon even before that photon is created, before it even exists. Even after the first photon ceases to exist and before the second photon is created, both become entangled even though there is no overlap in time. Photons that do not exist can effect photons which do exist and photons which no longer exist and photons which will exist (Megidish et al. 2013); and presumably the same applies to all particles, atoms, molecules (Wiegner, et al 2011). As dictated by the "uncertainty principle" energy and mass can be time-independent (Heisenberg 1927, 1958).

However, if the future present past are a continuum and the distinctions between them illusions, then the photons in the future already exist, in the future. The future already exists, now.

KARMA: HOW GOD AND THE UNIVERSE CAN BE SELF-CREATING

Since time is entangled with the electro-magnetic continuum; in a continuum, the future can overlap with and even come before the past and catch up with itself in the past, so that an event can be "simultaneous" with or occur before its cause. An event may be able to cause itself.

Thus, the universe-quantum-universe-continuum, could have caused itself--and if there is a god, then god could have created god--the universe could have created itself.

If time is considered from the perspective of space-like intervals and not time-like intervals, then causality can be forward, backward, or simultaneous (Bonor & Steadman, 2005; Buser et al. 2013; Carroll 2004; Gödel 1995). The future and the past become entangled as a continuity in space-time. If "God" is that continuum, made conscious, then the God-continuum can also have knowledge of the future before the future takes place. Likewise, effects in the future can affect the present.

For example, it is believed that "Karma" can affect a person's future, or reincarnated life. However, if there is Karma, then that future life can have a backwards-in-time effect. In other words, someone's "evil deeds" in the future, or in a future life, may cause suffering in the present. God may punish

the sinner before they sin, because the sin has already taken place: in the future.

It is well established that objects respond to and can influence and affect distant objects at speeds faster than light. This "spooky action at a distance" has been attributed to "fields," "mediator particles," gravity, and "quantum entanglement" (Bokulich & Jaeger, 2010; Juan et al. 2013; Sonner 2013).

It is believed that an electric "field" may mediate "electrostatic" interactions between electromagnetic charges and currents separated by great distances across space. However, these changes can take place at faster than light speeds. Charged particles, for example, produce an electric field around them which creates a "force" that effects other charges even at a distance. Maxwell's theories and equations incorporate these electrostatic physical "fields" to account for all electromagnetic interactions including action at a distance.

Since mass can become energy and energy mass, the "field" is therefore a physical entity that contains energy and has momentum which can be transmitted across space. Therefore, "action at a distance" may be both distant and local, a consequence of the interactions of these charges within the force field they create. However, the effects can be simultaneous, even at great distances, and occur faster than the speed of light (Plenio 2007; Juan et al. 2013; Francis 2012; Schrödinger & Dirac 1936), effecting electrons, photons, atoms, molecules and even diamonds (Lee et al. 2011; Matson 2012; Olaf et al. 2003; Schrödinger & Born 1935). The effect, therefore, may precede the cause since it takes place faster than light.

Correlation is not causation and it can't always be said with certainty which is the cause and which is the effect and this is because the cosmos is entangled as a basic oneness. According to the Tao, Gita, Upanishads, and so on: that oneness is god.

"Everywhere are His hands and legs, His eyes and faces, and He hears everything." --Bhagavad Gita, 13:14

"He is the source of light in all luminous objects. He is beyond the darkness of matter and is unmanifested. He is knowledge, He is the object of knowledge, and He is the goal of knowledge. He is situated in everyone's heart." --Bhagavad Gita, 13:18

GOD CONSCIOUSNESS AND THE QUANTUM CONTINUUM

The quantum continuum is without dimensions and encompasses space and time in its basic unity of oneness. Everything within the quantum continuum can be effected by local effects and distant effects simultaneously at and beyond light speeds; even the future can effect the present. Therefore, the future, and the "present" being part of this continuum can effect the past-present-future by effecting the wave function of the past, present, future, and thus, the space-time continuum, as all are entangled.

Quantum entanglement is a feature of time and the quantum continuum, this frenzied electromagnetic activity which is all things, encompassing even what some have called "god."

As based on quantum mechanics, it could be said that in space-time all things overlaps and coincide and exist side by side, including time, god, and consciousness. If consciousness is considered as spatial and different aspects of consciousness all all connected to the quantum continuum, then the future, past, and present coexists simultaneously, albeit continually in flux. Thus quantum consciousness, or god-consciousness, can be viewed as the union of all events in the same way that a line is the union of all of its points. God becomes all knowing, and what effects the future, can therefore effect the past as a continuity which is linked and not broken up and into isolated fragments which are separated by artificial time-like intervals. Likewise, when considered as phenomenon taking place in space, then the past can also effect the future as they are entangled as a unity.

If the world-line of cosmic consciousness is conceptualized as a string, then no matter where the string is plucked, the entire string will vibrate.

Since space-time includes "consciousness" then since space-time consists of energy which can become matter. Then consciousness is also interactional, which is why it can be experienced and perceived and why it can perceive. Consciousness can act on matter and time has energy which can become matter, a particle-wave duality which propagates through space. This implies that consciousness can also effect and warp the space-time continuum which includes multiple futures and multiple pasts which share world lines which can overlap and intersect one another. Again, if there is a god, or a quantum consciousness, then this god/consciousness is also a unity which creates singularities by becoming conscious and collapsing the wave function even

of events which take place in the future; and this is because the future is entangled with the present, past, and with the continuum which is all things.

"And his mind was afterwards clear as tehe morning, and after this he was able to see beyond his own individuality. that individuality perceived, he was able to banish all thoughts of past and present...." --Chuang Tzu

THE LIMITATIONS OF THE SENSES

"Whatever you see in existence, both moving and unmoving, is only the combination of the field of activities and the knower of the field."--Bhagavad Gita, 13:27

In relativity consciousness is merely relative. In quantum physics, consciousness and the act of observation and measurement constitute a separate reference frame which can collapse the wave function and register entangled interactions within the environment. Consciousness by the act of observation or measurement takes a static or series of pictures-in-time which then becomes discontinuous from the quantum continuum (Heisenberg 1958; Planck 1931; von Neumann 2001). These entanglements (Francis 2012; Juan et al. 2013; Plenio 2007), or blemishes in the quantum continuum, may be observed as shape, form, cause, effect, past, present, future, the passage of time, and thus reality; the result of a decoupling of quanta from the quantum (coherent) continuum which leaks out and then couples together in a knot of activity which is observed as a wave form collapse.

As based on the Copenhagen theory of quantum mechanics (Bohr, 1958, 1963; Heisenberg 1955, 1958), consciousness and reality are a manifestation of wave functions and alterations in patterns of activity within the quantum continuum which are perceived by consciousness as discontinuous--and that ultimate consciousness, the collective consciousness, could be construed as "god."

Wave form collapse is always a matter of probability, and is non-local, indeterministic and a consequence of conscious observation, measurement, and entanglement. Consciousness is entangled with the quantum continuum and can after the continuum and the space-time manifold.

Most religious, in their conceptions of "god" share similar conceptions. Consciousness, the act of observation be it visual, auditory, tactile,

mechanical, digital, is entangled with the quantum continuum and creates a static impression of just a fragment of that quantum frenzy that is registered in the mind of the observer as length, width, height, first, second, and so on; like taking a single picture of something in continual motion, metamorphosis, and transformation. That is, the act of sensory registration, be it a function of a single cell, or the conscious mind of a woman or man, selects a fragment of the infinite quantum possibilities and experiences it as real, but only to that mind or that cell at the moment of registration (Heisenberg 1955, 1958).

As demonstrated in quantum physics, the act of observation, measurement, and registration of an event, can effect that event, causing a collapse of a the wave function (Dirac 1966a,b; Heisenberg 1955), thereby registering form, length, shape which emerges like a blemish on the face of the quantum continuum. Thus, it can be said, at the moment the quantum continuum became conscious, achieved consciousness, this triggered a collapse of the wave function, and the universe came into being.

The mind, however, is not a singularity, but a multiplicity. The mind is also limited by its senses. Consciousness cannot perceive what it cannot perceive. Only fragments of the quantum continuum may be perceived by consciousness, and different aspect of consciousness--the multiplicity of mind--may perceive aspects of reality that other regions of the mind cannot perceive. However, they are perceived, because a mind becomes conscious of them.

“These realms are not come from somewhere outside thyself. Theey come from Within... they exist from eternity within the faculties of thine own intellect... issuing from within thine own brain... reflection of thine own thought-forms.” --Tibetan Book of the Dead

A radio or television receiver may be capable of receiving radio or television transmissions from hundreds or thousands of stations. These transmissions contain all manner of messages, voices, shapes, images, and information, and continue to be transmitted, even if the radio or television is off. There are other channels and other transmissions even if we have only one channel. This information is out there if we know it or not, and if we receive it or not.

However, we can only receive and perceive these messages, these images

if the television, internet, or radio is on. The number of stations and messages we can receive depends on the channel capacity of the radio/television receiver. That we cannot see or hear it without the proper receiver, or if the radio/television is off, does not mean that this information, these images, these sounds, do not exist, or that those who do perceive these stimuli are hallucinating.

The same is true regarding other realities, including those which may contain spirits, souls, gods or demons. What some perceive as a "demon" could well be an entity living in one of the multiple (probable) worlds predicted by quantum mechanics. Or, this same "demon" may be created by the act of observation--collapsing the wave form of the continuum, created by an observing consciousness; even when that consciousness has been liberated from a body which has died.

"No terrible god punishes you. The shapes of frightening monsters who take hold of you, place a rope along your neck and drag you along, are just illusions which you create from the forces within you.... there are no gods, and no demons." --Tibetan Book of the Dead

We can only perceive what we are able to perceive. Perception is also reality. Our senses not only limit and shape our perceptual reality, but the very act of perceiving can alter that reality; a phenomenon known as entanglement. What is observed is effected by being observed, as has also been demonstrated in quantum physics. Likewise, by changing one's perceptions, by changing the observer, can also change the reality that is being perceived; just like changing the channel on the radio or television.

Each conscious mind is entangled with the quantum continuum. Each mind, and each brain housing that mind, come into existence via the collapse of the wave function and the creation of decoherence. The mind is not "one" with the continuum because it represents a collapse of the wave function and is entangled yet separate from the continuum.

In part, the mind is restrained by its senses and perceptual capabilities, and the inhibitory influences that filter out stimuli which may be overwhelming. Our intellectual and perceptual capabilities cannot process what they cannot perceive or comprehend. Language and belief also act as yoke, by shaping perceptions and labeling that which is beyond the norm, as

abnormal, unnatural, crazy, and sinful.

However, trance states, isolation, fasting, prayer, meditation, dream states, and LSD, can free the mind of inhibitory restraint, producing not just dream-like hallucinations, but by opening the mind to a fuller range of experience, so that what is concealed may be revealed.

Yet, to enter into this other perceptual reality so that what is hidden is revealed, also entails the temporary annihilation of this world and this reality. Being becomes non-being, and non-being becomes being--which is also the philosophical view of the Tao.

IN THE BEGINNING THERE WAS LIFE

"Material nature and the living entities should be understood to be beginningless."---Bhagavad Gita, 13:20

According to Darwin (1871): "A belief in all-pervading spiritual agencies seems to be universal, and apparently follows from a considerable advance in man's reason, and from a still greater advance in his faculties of imagination, curiosity, and wonder. I am aware that the assumed instinctive belief in God has been used by many persons as an argument for His existence. But this is a rash argument, as we should be thus compelled to believe in the existence of many cruel and malignant spirits, only a little more powerful than man; for the belief in them is far more general than in a beneficent Deity."

Yet, despite, Darwin's rash claims to the otherwise, we are in fact spiritual beings, and there is scientific evidence to support these beliefs. We in fact possess the genetic and neurological capability to experience "gods" demons, spirits, souls, and other realities, for this reality is only one of many.

And, we possess a brain that not only shapes and filters this reality, but which, under certain conditions enables us to perceive at least some of these other probable realities. These same areas of the brain enable humans (and perhaps other animals) to experience the spirit and the soul as they transcend the body to traverse these myriad realms.

However, the spirit or soul, if comprised of energy, remain tethered to the body during life. But upon death, the energy is released to become one with the quantum continuum.

“All things begin from nothing and end in nothing.”-Chuang Tzu

“There is no difference between life and death. The destruction of life is not dying and the beginning of new life is not living. There is no differences between life and death.”-Chang Tzu

“There is a limit to our life, but to knowledge there is no limit.” -Chuang Tzu

“All things return to their root and disappear and do not know that it is it which presides over their doing.” -Tao Te Ching

“Tao is forever, and he that possesses it, though his body ceases, is not destroyed.” -Tao Te Ching

“And his was mind was afterwards clear as the morning, and after this he was able to see beyond his own individuality. Freed of this he was able to penetrate to the truth-- how the destruction of life is not dying-- that there is no differences between life and death.” -Chuang Tzu

Life, is common to life. Life has “life energy”--what some might call the “soul” or the essence or “spirit of god.”

If life is energy, then life/energy cannot be created or destroyed. There has always been life. There will always be life. The universe itself, is alive.

What we perceive as “individuality” is a manifestation of the wave form collapse; an entangled blemish in the quantum continuum. At the moment of death, as being is transformed into nonbeing, the energy which was the mass which was the individual, returns to the quantum continuum, and this is because energy cannot be destroyed. Energy can neither be created nor destroyed.

If life is energy, then life can be neither created nor destroyed. Rather the structural organization that gives form to life, the body, is subject to disintegration and decay. What we call death.

Again, consider Einstein’s theorem: i.e. $E=M/C^2$. Although energy cannot be destroyed or created, the destruction and transmutation of matter is something wholly different and is dependent on the organization and stability

of the force field which is energy.

Although material forms may become unstable, disintegrate or assume new organization, the constituent fabric that gives rise to matter and its manifest structure, is pure energy -which cannot be destroyed. However, if matter decays, if the body dies, that energy is liberated, although its material form appears to disintegrate and to die.

Birth is being. Death is the return to non-being: a return to the quantum continuum which is all things.

"Tao is forever and he that possesses it, Though his body ceases, is not destroyed." -Lao Tzu

"Thine own consciousness, shining, void, and inseparable from the Great Body of Radiance, hath no birth, nor death, and is the Immutable Light--Buddha Amitabha, the source of life and boundless light." -Bardo Thodol / Tibetan Book of the Dead

Death is generally a gradual process, with some cells and tissues disintegrating in advance of others, and yet other tissues living for hours or even days before the body completely decays.

Presumably, even after death, so long as the body and its brain lives, one's sense of a personal soul and identity remains intact. This personal identity is perceived, after the death of the body, as an out-of-body experience. Moreover, this personal identity, the energy field associated with the dying body, may be perceived by itself, or by others, as a ghost, spirit, or departing soul. Presumably, this ethereal after-death existence and sense of personal identity remains tethered to the body/brain until the body completely dies and decays.

Indeed, the linkage of the personal soul and individual immortality to the body were widespread beliefs and practices among the ancient Egyptians which is why they expended so much effort to preserve the body via mummification. If the body could be preserved, so could one's personal soul and sense of individuality, leading to "immortality".

Others, including the Tibetan Buddhists sought just the opposite, to free the soul from the body and so as to escape the "illusion" of individuality and personal existence.

Therefore, what some experience as their personal soul upon death, may be but a gradual liberation of LIFE that at first retains its bodily links, thus preserving one's sense of individuality; the shadow of one's previous form as the body dies.

As the body is consumed, perhaps so too is the sense of individuality, freeing the soul, one's LIFE, to be embraced by the radiance of all LIFE thereby becoming One with the god/universe: the quantum continuum.

REFERNCES

Bell, J. S. (1964) On the Einstein Podolsky Rosen Paradox, Physics 1, 3, 195–200 (1964)

Bell,J. S. (1966) On the problem of hidden variables in quantum mechanics, Rev. Mod. Phys. 38, 447 Bohr, N. (1934/1987), Atomic Theory and the Description of Nature, reprinted as The Philosophical Writings of Niels Bohr, Vol. I, Woodbridge: Ox Bow Press.

Bohr. N. (1949). "Discussions with Einstein on Epistemological Problems in Atomic Physics". In P. Schilpp. Albert Einstein: Philosopher-Scientist. Open Court.

Bohr, N. (1958/1987), Essays 1932-1957 on Atomic Physics and Human Knowledge, reprinted as The Philosophical Writings of Niels Bohr, Vol. II, Woodbridge: Ox Bow Press.

Bohr, N. (1963/1987), Essays 1958-1962 on Atomic Physics and Human Knowledge, reprinted as The Philosophical Writings of Niels Bohr, Vol. III, Woodbridge: Ox Bow Press.

Bonnor, W. Steadman, B.R (2005). "Exact solutions of the Einstein-Maxwell equations with closed timelike curves". Gen. Rel. Grav. 37 (11): 1833.

Born, M. Heisenberg, W. & Jordan, P. (1925) Zur Quantenmechanik II, Zeitschrift für Physik, 35, 557-615, 1925

Buser, M. et al. (2013). Visualization of the Gödel universe. New Journal of Physics. Vol. 15.

Carroll, S (2004). Spacetime and Geometry. Addison Wesley.

DeWitt, B. S., (1971). The Many-Universes Interpretation of Quantum Mechanics, in B. D.'Espagnat (ed.), Foundations of Quantum Mechanics, New York: Academic Press. pp. 167–218.

DeWitt, B. S. and Graham, N., editors (1973). The Many-Worlds

Interpretation of Quantum Mechanics. Princeton University Press, Princeton, New-Jersey.

Dirac, P. (1928). “The Quantum Theory of the Electron”. Proceedings of the Royal Society of London. Series A, 117 (778): 610–24.

Dirac, P. (1930) Principles of Quantum Mechanics

Dirac, P. (1966a) Lectures on Quantum Mechanics

Dirac, P. (1966b). Lectures on Quantum Field Theory .

Einstein, A. (1905a). Does the Inertia of a Body Depend upon its Energy Content? Annalen der Physik 18, 639-641.

Einstein, A. (1905b). Concerning an Heuristic Point of View Toward the Emission and Transformation of Light. Annalen der Physik 17, 132-148.

Einstein, A. (1906a). On the Theory of Light Production and Light Absorption. Annalen der Physik 20, 199-206.

Einstein, A. (1906b). The Principle of Conservation of Motion of the Center of Gravity and the Inertia of Energy. Annalen der Physik 20, 627-633.

Einstein, A. (1926). Letter to Max Born. The Born-Einstein Letters (translated by Irene Born) Walker and Company, New York.

Everett , H (1956), Theory of the Universal Wavefunction”,Thesis, Princeton University

Everett, H. (1957) Relative State Formulation of Quantum Mechanics, Reviews of Modern Physics vol 29, 454–462.

Einstein A, Podolsky B, Rosen N (1935). “Can Quantum-Mechanical Description of Physical Reality Be Considered Complete?”. Phys. Rev. 47 (10): 777–780.

Gödel (1995) Lecture on rotating universes Kurt Gödel: Collected Works (Unpublished Essays and Lectures vol 3) ed S Feferman (Oxford: Oxford University Press)

Heisenberg, W. (1925) Über quantentheoretische Umdeutung kinematischer und mechanischer Beziehungen, (“Quantum-Theoretical Re-interpretation of Kinematic and Mechanical Relations”) Zeitschrift für Physik, 33, 879-893, 1925

Heisenberg, W. (1927), “Über den anschaulichen Inhalt der quantentheoretischen Kinematik und Mechanik”, Zeitschrift für Physik 43 (3–4): 172–198,

Heisenberg. W. (1930), Physikalische Prinzipien der Quantentheorie (Leipzig: Hirzel). English translation The Physical Principles of Quantum

Theory, University of Chicago Press.

Heisenberg, W. (1955). The Development of the Interpretation of the Quantum Theory, in W. Pauli (ed), Niels Bohr and the Development of Physics, 35, London: Pergamon pp. 12-29.

Heisenberg, W. (1958), Physics and Philosophy: The Revolution in Modern Science, London: Goerge Allen & Unwin.

Joseph, R. (2014). The Quantum Physics of Time Travel. Cosmology Science Publishers

Juan Yin, et al. (2013). "Bounding the speed of `spooky action at a distance". Phys. Rev. Lett. 110, 260407.

Langevin, P. (1911), "The evolution of space and time", Scientia X: 31–54

Lee, K.C., et al. (2011). "Entangling macroscopic diamonds at room temperature". Science 334 (6060): 1253–1256.

Matson, J. (2012) Quantum teleportation achieved over record distances, Nature, 13 August

Matthew. F. (2012). Quantum entanglement shows that reality can't be local, Ars Technica, 30 October 2012

Nairz, O. et al. (2003) "Quantum interference experiments with large molecules", American Journal of Physics, 71 (April 2003) 319-325.

Olaf, N.. et al. (2003) "Quantum interference experiments with large molecules", American Journal of Physics, 71 (April 2003) 319-325.

Plenio, V. (2007). "An introduction to entanglement measures". Quant. Inf. Comp. 1: 1–51

Schrödinger, E. (1926). "An Undulatory Theory of the Mechanics of Atoms and Molecules". Physical Review 28 (6): 1049–1070. Bibcode:1926PhRv...28.1049S. doi:10.1103/PhysRev.28.1049.

Schrödinger E; Born, M. (1935). "Discussion of probability relations between separated systems". Mathematical Proceedings of the Cambridge Philosophical Society 31 (4): 555–563.

Schrödinger E; Dirac, P. A. M. (1936). "Probability relations between separated systems". Mathematical Proceedings of the Cambridge Philosophical Society 32 (3): 446–452.

Yin, J. et al. (2013). "Bounding the speed of `spooky action at a distance". Phys. Rev. Lett. 110, 260407.